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Contents . . June 24, 1935

Volume 96 • Number 25

AS THE EDITOR VIEWS THE NEWS 13

Tax Plan, Menacing Surpluses and Holding Companies, Heads New Deal Thrust 14
Eastman Urges Direct Selling for Railroad Scrap 16
Fifty-three Man-hours Labor in Ton of Finished Steel 17
Survey Indicates Skilled Labor Shortage 18

- Production 18
- New Capacity 22
- Labor 22
- Meetings 81
- Makers', Users' Activities 81

Windows of Washington 19
Steel Founders on Code Standards 20
Mirrors of Motordom 21
Steel Seller Points Way to Tariff Control 23
Founders Hold to Code Principles 24
Calumet Steel Now Borg-Warner Subsidiary 24
Industrial Men in the Day's News 25
Obituaries 26
Railroad Shops Need New Tools 80

EDITORIAL—Put Homes on Par with Autos! 27

THE BUSINESS TREND 28

ENGINEERING DEVELOPMENTS:

- Hardening Tool Steels 30
- New Uses for Malleable 33
- Effects of Molybdenum 35
- To Buy or Not To Buy?—IV 36
- Methods and Materials 38
- Saves on Pattern Costs 38
- Light Weight Box Car 41
- Robert E. Kinkead 41
- Steel for Hose Clamps 42
- Spray Descaling of Steel 43
- Adopt Plating Standards 47
- Progress in Steelmaking 49
- Open Hearth Design—IV 50
- New Equipment 56
- Trade Publications 60

MARKET REPORTS AND PRICES 62-82
CONSTRUCTION AND ENTERPRISE 82
ADVERTISERS' INDEX 90

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As the Editor Views the News

ALL four of the major developments in Washington last week bear directly upon the operations of American industry. The skeletonized NIRA is a makeshift stopgap for the original act. The Wagner bill, avowedly rushed through as a substitute for the voided section 7a, will cause more trouble than its predecessor and in the end will accomplish even less for industrial employes. The security bill, loosely drawn, may be further revised in conference. The taxation message of the President, breathing the spirit of "soaking" the big and the rich, is highly significant politically and from the standpoint of finances of industrial corporations.

• • •

This Is New New Deal!

These moves constitute the new deal's impromptu program to salvage something from ruins left by the adverse rulings of the Supreme Court on May 27. It is quite possible that this substitute program will prove to impose more hardships upon industry than were suffered under the original new deal plans. If so, there will be a tendency in some quarters to decry the court rulings as a bad thing for industry. This would be a most unfortunate and improper conclusion, because in the long run the far-reaching decisions of May 27 are bound to provide important and enduring benefits for industrial companies.

• • •

Don't Be Too Impetuous

These benefits will be realized promptly if industrial executives can keep their heads during the present transition period. Industry faces the problem of shifting from a condition of enforceable code regulation to one of voluntary co-operation. It is important for everybody—producer and consumer, seller and buyer, employer and employe, stockholder and the public—that this transformation be accomplished gradually and with as little confusion as possible. We hope no one will act impetuously—on prices, wages, hours or working conditions—during the transition period. Later on there will be plenty of time and opportunity for the inevitable adjustments which are necessary to permit industrial operations to respond to wholesome economic influences. Thus far, industry generally has met this challenge with commendable spirit. As a result business has been affected only slightly (p. 28) by the sudden change of policy.

• • •

Working in Thousandths

Many users of mechanical equipment do not realize the extent to which American industry has reduced tolerances in machining and assembly operations in recent years. The machine tool industry, makers of the master tools of all industries, now is thinking within limits of 0.0001-inch (p. 36), whereas only a few years ago it thought in terms of 0.001-inch. This reduction brings incalculable savings to manufacturers of metal products, not only in increased production and higher quality but also in lower costs of inspection and assembly. The high degree of accuracy in recently developed machine tools is another pertinent reason why manufacturers cannot afford to be without modern machine shop equipment.

• • •

Saving 25% In Weight

Visitors to the convention of the American Railway association in Chicago next Wednesday and Thursday will see a box car built along the conventional lines of the ARA 1932 design, but weighing 25 per cent less than the standard car (p. 41), owing to the liberal use of low-alloy, high-tensile steel. . . . Who would think that the ordinary hose clamp, made from cold rolled strip steel (p. 42), represents a market amounting to more than 1500 tons of steel annually? . . . . Descaling steel has become an important operation in rolling certain highly finished products. The system for a continuous wide strip mill (p. 43), involving pump, accumulator, distributing lines, spray valves and nozzles, illustrates a new chapter in the effort to produce rolled steel of high quality.

E. L. Shaner

Tax Plan, Menacing Surpluses and Holding Companies, Heads New Deal Thrust

Washington

SLOWED down for three weeks by the Supreme Court decision invalidating the original setup of NRA, the new deal juggernaut regained momentum last week and made a 4-point advance on the iron and steel industry:

1 and 2—It got the Wagner-Connery labor disputes and the social security bills through the house and into conference.

3—It launched a revolutionary tax program, calculated to spread wealth through heavier levies on corporations, personal incomes and inheritances, and later probably also on corporation surpluses to eliminate holding companies.

4—It created a skeletonized NRA.

TAX PROGRAM

In its far-reaching implications, nothing yet proposed by the Roosevelt administration hits steel so hard as the tax program, characterized by some as the most revolutionary ever to emanate from the White House.

Immediately, if the President's special message of June 19 to congress bears fruit, the present flat corporation tax of 13¾ per cent will be revised to a graduated scale, beginning at 10¾ per cent for small corporations and increasing to a maximum of 16¾ per cent for large ones.

As yet no brackets have been specified, but the speculation in Washington is that most steel producers will pay at least the current levy of 13¾ per cent and certainly the larger ones the full 16¾ per cent, which would represent an increase of 22 per cent over the present rate. A measure passed at this session might be made effective beginning Jan. 1 of this year.

50 Cents a Ton Tax Now

As an example of the incidence of a heavier corporation tax, the United States Steel Corp., largest single producer and accounting for 40 per cent of all capacity, in 1934 paid federal taxes totaling $4,500,000. State and local taxations, incidentally, were seven times larger. The 1934 federal tax was the equivalent of 50 cents on every ton of rolled steel made. Typical of the federal tax experience of a moderate-size company, the National Steel Corp., sixth largest interest, in 1934 paid $1,200,000 in federal taxes.

For consideration at the next session of congress the President has urged discouragement of "unwieldy and unnecessary corporate surpluses" and simplification of corporate structures through elimination of unnecessary holding companies—both to be effected by using the taxing power.

This carries over into steel and other lines the President's implacable feeling against holding companies in general and utilities in particular. In steel, the United States Steel Corp. obviously is the outstanding holding company. Into a general classification of holding companies also might fall, in lesser degree, the Bethlehem Steel Corp., Republic Steel Corp., and National Steel Corp., but it would take much imagination.

Producers like the Jones & Laughlin Steel Corp., Inland Steel Co., Wheeling Steel Corp. and several others have, in the main achieved size through internal expansion rather than acquisition of other companies, and are in another category. This, of course, is purely speculation at this time, and there is nothing definite from Washington indicating any special attitude toward any particular company.

Leon C. Marshall

James L. O'Neill, one-time credit official for Carnegie Steel Co., made temporary administrator of NRA. Wide World Photo

Avid Eyes on Surpluses

The proposal to tax corporation surpluses is an oblique effort to distribute corporation profits among labor. In some respects, many in congress eye surpluses as so much cash lying idle or as profit-returning investments, whereas in the case of steel they actually represent plant facilities, inventories and so on.

But these surpluses appear to the new deal like so many melons to cut and distribute. The United States Steel Corp., for example, on last Dec. 31 reported earned surplus of $526,575,000, of which $270,000,000 was

appropriated for and invested in capital expenditures, and $258,575,000 was the undivided surplus of the Corporation and its subsidiaries. Again using National Steel as typical of the average producers, its capital surplus last Dec. 31 totaled $44,500,000, earned surplus $8,200,000.

It should be understood that the punitive portion of the tax program still is nebulous, it is not slated for consideration at this session of congress, and may represent a threat by the administration to induce some important voluntary changes in the corporate setups of large companies, including steel ones. It is recalled that after the breakup of the Standard Oil Co. the value of the pieces was far greater than that of the original single centralized unit.

Affecting iron and steel executives individually are the proposals to impose heavier inheritance and gift taxes on large estates, to practically confiscate all incomes exceeding $1,000,000 annually, and a constitutional amendment for federal taxation of income from all federal, state and local securities issued in the future.

SECURITY PROGRAM

Much of the sting for iron and steel producers in this program has been eliminated by the exemption of private pension plans satisfactory to federal authorities. Presumably this would bypass many of the larger producers, although the opportunity for technicalities to estop acceptance is great.

For old age pensions the following levies would be made on employers and employes alike: 1 per cent on wages for 1937 to 1939, 1½ per cent 1940 to 1942, 2 per cent 1943 to 1945, 2½ per cent 1946 to 1948 and thereafter 3 per cent.

To finance unemployment payments, employers would be taxed 1 per cent of their payrolls for 1936, 2 per cent for 1937, and 3 per cent thereafter.

Recording of detail of the old age pension and unemployment insurance programs would require many pages, impossible here, but in general, old age pensions begin at age 65 and the maximum is to be $85 per month. Employers will be credited with up to 90 per cent of unemployment taxes paid to states. The federal contribution on old age pensions will be not to exceed one-half the sum, to a maximum of $15 per month.

To afford a basis on which to estimate the incidence of these levies upon steel, total payrolls of the iron and steel industry in April were $45,890,244 or at the rate of $550,000,000 a year. One per cent for unemployment insurance would mean an annual impost of $5,500,000. The initial levy for old age pensions the first year would be $5,500,000 each from employers and employes.

The bill now goes to conference.

WAGNER-CONNERY LABOR BILL

Organized labor is hailing the labor disputes bill, passed by the house June 19 and now in conference to reconcile differences with the senate, as the magna charta of labor, but industry will probably hail it into the Supreme Court.

In its present form the bill is substantially as obnoxious to industry as ever, but the Supreme Court decision in the Schechter case is believed to have cut the ground out from under it. An effort will be made to rush a test case through the court, beginning with the fall term and possibly reaching the decision state by early 1936.

In the house an important amendment, objectionable to the administration, was adopted. This provides that the unit of representation of employes for collective bargaining shall be limited to one employer.

In other words, it would be impossible for employes at the Indiana Harbor plants of the Inland Steel Co. and Youngstown Sheet & Tube Co., just across the ship canal, to attempt pool negotiations; each plant must stand individually. This amendment apparently will hit the United Mine Workers and the various textile unions hardest.

Another upset in the house which is a defeat for Secretary of Labor Perkins is that the proposed national labor relations board will be an independent body rather than an appendage of the department of labor. This board of three will be paid $10,000 each, for staggered five-year terms.

In effect, the Wagner-Connery bill restates section 7a of the recovery act, establishes collective bargaining, provides for plant elections with representation to be decided by the majority, and prohibits any interference with or coercion of employes, domination of any labor organization by employers or any contribution to it, and any measures calculated to repress outside organizations.

The practical effect on the steel industry would be to eliminate employe representation plans wherever a militant minority becomes active.

REVISED NRA

Under the extension of the national industrial recovery act to April 1, 1935, on an attenuated basis, the President June 15 set up a skeleton organization.

James L. O'Neill, for 22 years credit manager of the Carnegie Steel Co., Pittsburgh, and since 1918 with the Guaranty Trust Co., New York, at present operating vice president, has been appointed administrator of the NRA. He has been loaned by the Guaranty company until Sept. 1.

Leon C. Marshall, long identified with the original NRA and recently a member of the industrial recovery board, is director of the division of review which is to write a history of NRA and study the effects of codes on trade, industrial and labor conditions.

Heading up the division of busi-

Bringing the Weld to the Veldt

Here are 25 executives and "key" men of McKinnon-Columbus Chain Ltd., St. Catherines, Ont., sailing for London on the first leg of their journey to Veerniging, near Johannesburg, South Africa, where they will install electric welding machinery in the new South African plant of the company to be known as McKinnon Chain-South Africa Ltd. F. E. Stahl, manager of plants for McKinnon - Columbus Chain Ltd., the Columbus - McKinnon Chain Corp. and the Chisholm-Moore Hoist Corp., is in charge. Among those sailing were William H. Allan, Albert A. Clarke, H. Cooper, Charles G. Frech, G. H. Guderian, John T. Holler, A. Jackson, Bruce McKinnon, James M. Rennie, W. J. Schwinger, Ross Smith, F. E. Stahl, Dushon Vezmar and Walter Wolf

ness co-operation, which will assist in the voluntary maintenance of wage, hour and ethical standards is Prentiss J. Coonley, formerly a code administration director.

Assistant to Administrator O'Neill is George L. Berry, president of the printing pressmen's union and former division administrator.

Comprising an advisory council are Charles Edison, former member of the industrial recovery board; Howell Cheney, silk manufacturer; Philip Murray, former member of the recovery board and a vice president of the United Mine Workers; William Green, president of the American Federation of Labor; Prof. Walton H. Hamilton of Yale, also a former member of the recovery board; and Emily Newell Blair, former chairman of the consumers' advisory board.

Eastman Urges Direct Selling, Joint Yards for Rail Scrap

RAILROADS of the United States in 1933 gathered, classified and sold scrap of their own production to a value of $27,000,000 and in the process reclaimed for further use equipment and materials that would have cost $17,000,000 new. These figures are developed from a survey undertaken by direction of Joseph B. Eastman, federal coordinator of transportation, and was under supervision of R. L. Lockwood, director of the section of purchases.

Inasmuch as 1933 saw railroad operation at a low level and scrap prices depressed, it is probable that in ordinarily active years the scrap activities of railroads represent more than $50,000,000 of income.

The survey sought data on four principal points: Cost of preparing scrap and revenue resulting from its sale; advantages and disadvantages of dismantling equipment or selling it on wheels; possibilities of economies of central scrap plants by two or more roads; relative position of the railroads as scrap producers.

Three Ways To Profit

The conclusion was reached that dismantling of rolling stock by the railroads would have netted $1,700,000 more than was obtained from sale on wheels. A further increase in revenue of $555,000 is believed possible had all scrap been classified and prepared to its highest grade. Sale of more tonnage direct to consumers is estimated to hold possiblities for increased income of $1,600,000 on the basis of 1933 figures. These three avenues of further income total $3,855,000.

Statistics gathered for 1933 show ferrous scrap shipped on sales orders totaled 2,916,974 net tons, for which $22,804,052 was paid. No. 1 heavy melting steel made up 20.55 per cent of this total, with 599,376 tons. Nonferrous scrap shipped on sales orders totaled 35,523,088 pounds, for which $1,313,527 was realized, No. 4 brass constituting 16.39 per cent.

Ohio produced 19.45 per cent of the total of ferrous scrap, Pennsylvania 18.39 per cent, Illinois 15.34 per cent. Railroad scrap exported in 1933 totaled 99,779 tons, of which Japan took 83,291 tons.

Reports were asked on costs of operating scrap sorting plants for 1933 and a formula was developed in an effort to take account of irregularities. Of 80 reports received, 11 could not be put on a comparable basis. For the remaining 69 the average cost of unloading, sorting, preparing and reloading per net ton was $1.231, of which $0.913 covered charges for direct labor, supervision, tools, supplies and repairs.

District Costs Compared

The average for the eastern district was $1.046, for the southern district $1.046 and for the western district $1.425. Excess cost in the western district results from high cost of labor, tools, supplies and repairs, these being about 33 cents above those for the eastern district.

Many variations were met compiling these data, such as the degree of sorting and preparation, some scrap requiring much handling per ton and other grades almost none. Again, scrap received at the yards is not equally classified at the loading point and may require more separation in some cases than in others.

Reports of dismantling costs on locomotives and cars containing 1,208,445 net tons of scrap gave an average of $1.21 per ton. Forty roads reported costs giving an average of $1.78 per ton and 68 roads reported costs averaging $1.58 per ton. Costs per ton by individual roads varied from 33 cents to $5.58 per ton for cars and 84 cents to $4.81 for locomotives.

Recommendations following the survey are as follows:

That individual roads co-operate in joint study of the data to discover possible improvements; that scrap be prepared to the highest possible grades; that equipment be dismantled rather than sold on wheels; that uniform accounting be used and more detailed costs be determined; that scrap sorting and dismantling operations be combined; that possibilities of establishment of group marketing agencies be studied; that means be studied for dismantling and scrap handling operations of groups of roads in centralized plants.

Commenting on possibilities of increased returns from sale by group marketing, the report calls attention to the fact that in 1933 about 29 per cent of all scrap was sold direct to the ultimate consumer. Had the entire tonnage been disposed of in this way instead of through middlemen the increased return, as previously stated, would have been $1,600,000.

Fail To Realize Advantage

Comparison of prices of heavy melting steel and pig iron for a long period shows that these were close in price until 1917 and since that year scrap prices have been relatively considerably lower. The conclusion is that railroads have not realized their potential advantages as the largest single producing unit of high quality scrap.

Attention is called to the fact that direct selling is limited by the fact that railroads are unable to supply customers with all grades and the latter must rely on dealers for much of their supplies.

Conversely, the consumers cannot take direct all grades of scrap offered by the roads, the dealer again being necessary in disposal of this remainder.

It is suggested that the establishment of a few central agencies to market all railroad scrap would overcome these obstacles and remove the embarrassment of individual roads negotiating with consumers and dealers, with the resulting possibilities of reprisals in reduced traffic.

Much is believed possible in economies from establishment of concentrated scrap handling facilities for two or more roads. Labor would be employed more steadily and would become more skilled and a small force could handle a much larger volume that when intermittently busy. Obstacles met in the cost of return of usable materials salvaged in dismantling operations are not believed to be important.

Mr. Lockwood, in his letter of transmittal to Mr. Eastman points out that the report is broad in its scope and "while analysis of the data . . . indicates that each of the recommendations is highly desirable from the standpoint of the roads as a whole, it is recognized that some of them might not be applicable in the same degree to every road."

Fifty-three Man-hours Labor In Ton of Finished Steel

FIFTY-THREE man-hours of labor are required for the production of one gross ton of finished steel when the steel industry is operating at 55 to 60 per cent, according to a survey by the bureau of labor statistics, Washington, in which 15 representative steel companies co-operated.

The extraction of the necessary materials takes 7.75 hours; their transportation 8 hours; the coke manufacture 1.5 hours; the manufacture of the pig iron, the ingot and the finished steel 34.43 hours, and administration 1.32 hours.

The bureau made the survey in connection with the public works relief program, to determine where labor is used the most in manufacturing. No comparisons are given with other industries, but the inference is that steel stands high, and therefore projects which require steel will be given preference over those in which labor is less important.

Breakdown of Material Use

A noteworthy fact disclosed is that for each gross ton of finished product approximately six tons of raw materials is consumed. An indication of the variety and relative importance of the materials is given in the following table:

Basic material	Gross tons	Per cent
Iron ore	2.196	36.6
Flux	.666	11.1
Coking coal	1.506	25.1
Other fuel (for power and heat)	.732	12.2
Scrap iron and steel	.594	9.9
Metals and alloys	.114	1.9
Miscellaneous	.192	3.2
Total	6.000	100.0

The actual quantity of material consumed was found to vary considerably, but for these as well as the other factors considered only averages are represented.

The next step was to determine the hours required in manufacturing a ton of pig iron, and the following is a recapitulation of these elements:

Mining:	Man-hours
Iron ore, including cinder, etc.	1.8
Coal	2.4
Fluxing material	0.2
Total	4.4
Transportation:	
Iron ore	2.0
Coal	1.6
Fluxing material	0.5
Total	4.1
Manufacturing:	
Blast-furnace operation	2.3
Converting coal to coke	1.2
Grand total	12.0

Although pig iron is the basis of steel, scrap has become increasingly important, and it is estimated that nearly half the burden of all open-hearth furnaces in the country now is scrap. Some bulk scrap is available at the mill, since an average of only 0.689-ton of finished steel product is manufactured from a ton of steel ingots, but a part of the scrap is purchased.

Importance of Ferroalloys

Other important materials used in converting the pig iron into steel ingots include ferroalloys. Ordinary carbon steel, according to the bureau's report, "has been unable to keep pace with the tempo of the times, and consequently vanadium, tungsten, manganese, nickel, molybdenum and chromium now hold a prominent place in production of steel." The proportion and combination of these ingredients depend upon the kind of steel that is being manufactured.

In the aggregate the production of all the additional materials, with additional labor required in transportation and manufacture accounts for 5 or more man-hours, bringing the total labor requirements per gross ton of steel ingots to 17 hours. Of the total additional hours of employment created in the production of steel ingots, approximately 3 are allocated to manufacture, and 1 each to transportation and extraction.

Having determined the hours required in extraction, transportation and manufacture of the basic products from which steel is made it was possible to ascertain the hours required in making semifinished and finished products, and in this the bureau had access to the steel producers' cost records.

The data obtained from the 15 mills concerning the hours required in the manufacture of semifinished and certain important groups of finished steel are summarized in an accompanying table.

From this table it will be observed that 29.03 hours are required in the production of billets and slabs.

"This means," the report states, "that in addition to the 17 man-hours required in the production of ingots, 12.03 man-hours are needed for each ton of these semifinished products. More than half of this increase — 7.44 man-hours — is accounted for in the manufacturing process (6.89 man-hours in production, and 0.55 man-hours for administrative and general overhead). The remaining increase—4.59 man-hours—results from the scrap and metallic losses which occur in converting ingots into billets and slabs, and is accounted for by the fact that a ton of ingots is equivalent to approximately only 0.78 ton of billets and slabs.

More Labor Required

"For this reason, the labor requirements in billets and slabs chargeable to extraction increase from 5.27 man-hours in the production of ingots to 6.69 man-hours in the production of billets and slabs, while the transportation man-hours increase from 5.10 to 6.48, with increases in man-hours in manufacture of coke and ingots from 6.63 to 8.42. It follows, of course, that

Man-hours Required for Gross Ton of Finished Steel Products

Product	Number of man-hours: Total	Extraction	Transportation	Coke manufacture	Manufacture	Administrative*
Average, all products	53.00	7.75	8.00	1.50	34.43	1.32
Billets and slabs	29.03	6.69	6.48	1.33	13.98	.55
Structural shapes, in rolled form, not fabricated	33.91	7.27	7.04	1.45	17.46	.69
Wire rods	35.60	6.92	7.70	1.38	18.85	.75
Plates, sheared and universal	36.54	7.96	7.70	1.58	18.56	.74
Concrete reinforcing bars	36.97	7.38	7.64	1.47	19.70	.78
Standard rails, including fastenings	38.54	7.80	7.55	1.55	20.82	.82
Bar steel (merchant steel bars, light shapes, etc.)	39.35	7.85	7.60	1.56	21.49	.85
Hoops and bands	42.00	7.85	7.60	1.56	24.04	.95
Wire, drawn	51.19	7.17	8.04	1.43	33.23	1.32
Sheets, all grades	58.19	8.70	9.62	1.73	36.68	1.46
Wire fencing	60.37	7.38	8.24	1.47	41.63	1.65
Wire nails	61.61	7.48	8.24	1.49	42.70	1.70
Pipe and tubing	62.72	9.00	9.02	1.80	41.26	1.64
Steel car wheels (rolled)	63.97	9.75	9.44	1.94	41.20	1.64
Railroad axles	64.07	10.28	10.15	2.05	40.00	1.59
Wire, flat, including steel in strips	67.00	8.43	9.46	1.68	45.62	1.81
Tin plate—terneplate	80.63	8.64	9.56	1.72	58.39	2.32
Fabricated structural work	84.00	8.00	8.95	1.60	62.95	2.50

*Includes salaried workers, sales force, and other general administrative employes. The allocation of man-hours to the respective classes of finished products is obviously to some extent made arbitrarily. The figures are based on 55-60 per cent operations.

these conversion losses increase as the products beyond the ingot stage receive further processing, resulting, in the case of all finished steel products, in an average yield of approximately only 0.68 ton from a ton of ingots."

One of the interesting features is that showing how labor requirements depend upon the rate of operation, as most of the mills are designed for high-speed volume production. This is summarized in the following table:

Per cent of total plant capacity	Actual average man-hours* Manufacture	Administration
55 to 60	34.43	1.32
50 to 55	36.15	1.47
45 to 50	38.22	1.73
40 to 45	40.63	1.94
35 to 40	42.34	2.25
30 to 35	43.73	2.65
25 to 30	45.10	2.92
20 to 25	46.48	3.26

*Does not include transportation and extraction.

This table indicates that in the manufacturing process alone the man-hours per ton of finished steel products advances from an average of 34.43 when the mill is operating at 55 to 60 per cent to 46.68 when the rate of operation drops to between 20 and 25 per cent—an increase of 35 per cent.

In the bracket at which steelworks are operating today—35 to 40 per cent—the average man-hours in the manufacture of a gross ton of finished steel is 42.34.

Survey Indicates Labor Shortage

AMONG 287 metal manufacturing companies which in the aggregate employ 115,260 wage earners there is reported an actual present shortage of 1193 skilled craftsmen, or 1.04 per cent of total employment.

The National Industrial Conference board, New York, analyzing the results of this survey in which the companies co-operated, states the shortage that would exist, if they were operated at normal capacity, amounts to 6.7 per cent of the aggregate number of employes.

"If these proportions may be regarded as representative," says the board, "they indicate a total present shortage in metalworking industries of 19,034 skilled workers, and a shortage, if operating at normal capacity, of 123,357."

The employers' suggestions for remedying this situation were obtained, and first in the list is: "Abolition of the NRA, and code limitations on working hours, which would substantially increase the productivity of existing labor."

The survey was made just prior to the Supreme Court's decision, and inferentially this No. 1 obstacle now has been removed.

Other suggestions are for alteration of relief procedure in order not deter machinists from accepting work in industry, even if it is temporary, for fear of losing a place on the relief rolls.

It is recommended that the government discontinue proselyting of industrial labor, and that public works wage scales be brought into line with actual prevailing wages.

Relaxation of restrictions to encourage immigration from Europe of highly skilled labor, also is mentioned, as is the allocation of part of the the government expenditures under the works relief bill to finance the training of unemployed labor, and at least temporary relaxation of age limit requirements to permit employment of older skilled workers who are still available.

The final suggestion is for further improving machine tools to make them more automatic and so reduce the need for skilled labor.

Production

A GENERAL letdown which cut across all operating districts last week, except Wheeling, as the turn of the half year approached, resulted in a decline of 3½ points to 35½ per cent in the steelworks operating rate. Details follow:

Youngstown—Sagged 1 point last week to 41 per cent. Slightly higher operations at Republic Steel Corp.'s Warren, O., plant are expected to lift the rate to 42 per cent at this week's start.

Wheeling—Unchanged for the third successive week at 48 per cent, steel ingot operations here are maintained by operation of 18 out of 37 open-hearth furnaces. The 18 furnaces are being operated by three of the district's four plants.

Pittsburgh—Off 2 points to 30 per cent, due to the leading interest operating through last week at 28-29 per cent, although the leading independent's ingot operations were unchanged at 35-36 per cent through the week.

With Pittsburgh Steel resuming operation in its banked Monessen, Pa., blast furnace, 22 out of 60 steelworks blast furnaces are now on active schedule here. Carnegie has 8 of 32 in blast; Jones & Laughlin, 6 of 11; National Tube, 2 of 4, and 1 of 2 each for American Steel & Wire, Pittsburgh Crucible Steel, and Pittsburgh Steel. At Johnstown, Pa., Bethlehem is operating 3 of 7 blast furnaces.

Chicago—Off 2 points for the second consecutive week, to 39 per cent. A slight stiffening in operating schedules was noted as the week closed and little further decline is in prospect for the current period. Operations are not expected to touch the 1934 summer low point this year. Fourteen of 36 steelworks stacks still are active.

Cleveland-Lorain—Down 3 points to 48 per cent, National Tube Co., Lorain, dropping one open hearth to operate eight; Corrigan, McKinney Steel Co. continuing with seven, and Otis Steel Co. with four.

New England—Off 4 points to 56 per cent last week. Open hearth schedules for this week indicate a rate of several points above this output.

Birmingham—Off fractionally to 30 per cent, with no indication of any increase at this time.

Buffalo—Down 3 points to 32 per cent, with 12 open hearths in production. Operations will continue at this rate this week.

Central eastern seaboard—Declined 1 point to 29 per cent. New buying the past few days has dropped sharply and this combined with a fair accumulation of ingots indicates a further reduction in output will eventuate shortly.

Detroit—Down 24 points to 70 per cent, one producer operating variably, averaging four out of nine on, and another interest scheduling all eight.

Steelmaking Operations

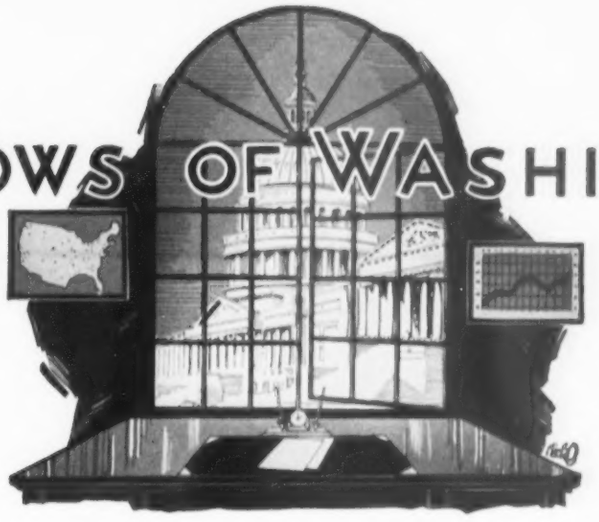
Percentage of Open Hearth Ingot Capacity Engaged in 10 Leading Districts

	Week ended June 22	Change	Same week 1934	Same week 1933
Pittsburgh	30	— 2	56	41
Chicago	39	— 2	63	50
Eastern Pa.	29	— 1	46	33½
Youngstown	41	— 1	62	52
Wheeling	48	None	81	84
Cleveland	48	— 3	76	80
Buffalo	32	— 3	47	48
Birmingham	30	— ½	55	50
New England	56	— 4	70	81½
Detroit	70	24	82	38
	35½	— 3½	59	51

SHEET ACTIVITY EBBS

Sheet steel sales, production and shipments declined further in May, according to the National Association of Flat Rolled Steel Manufacturers, Pittsburgh. Daily average sales dropped from 5603 net tons in April to 4829 tons in May; production, from 6974 tons to 6178 tons; and shipments, from 6745 tons to 6031 tons. Totals for May: Sales 149,725 tons; production 191,507 tons; shipments 186,971 tons. Total sheet capacity in the United States for the month was 500,000, and the association's reports are based on a capacity of 300,000 tons.

WINDOWS OF WASHINGTON



WASHINGTON

PERHAPS the Supreme Court decision making NRA as sick as the chickens in the Schechter case will prove to be a pyrrhic victory for business. At any rate, since the decision was handed down May 27 and the President vented his resentment May 31, he has noticeably veered toward the left.

The Wagner-Connery labor disputes bill (p. 15) went on the "must" legislative list. The administration's effort to make the utility bill a punitive rather than a regulatory measure was redoubled, but incidentally may fail. The President has come out more strongly for the Guffey coal control and for controversial features of the banking bill.

And to climax it, a special message last Wednesday carried to congress probably the most radical tax program (p. 14) ever promulgated by an administration. Any doubts concerning its revolutionary character were dispelled when Senator Huey Long, bitter critic of the President, jumped to his feet at the conclusion of the message and shouted "amen."

Forecasts Borne Out

Two weeks ago this department forecast that, notwithstanding the apparent attitude of the new deal to give industry a free rein to recover, the actual situation would be to dare industry to recover. At that time the formation of a tax program of serious consequent also was forecast. Both are coming true.

To an extent startling to an outsider, the gossip in Washington is that the President is now bent more than ever upon effecting reform prior to recovery, that business is implacably in opposition, and that his best chance for 1936 is to woo back the left wingers from whom he parted company when he began flirting with the center.

The President's bitterness—for such it is—against utility holding companies appears to have spread to all large corporations in the holding category. His tax program evidently is doubled-barreled; if the increase to 16¾ per cent in the corporation tax misses any corporations because they are not in the profit area, then the proposed levy upon corporation surpluses will nick them.

The timing of the tax message apparently was excellent. In another week the first half year will have ended and a week or two after that financial reports for this period will begin coming out. For steel and probably also for a number of large industries these reports will be the best in several depression years—possibly since the first half of 1930. It will be music to the ears of persons on relief to hear of corporations being taxed.

O'NEILL, EX-STEEL MAN AND REPUBLICAN, LOOKS AHEAD

There are some mighty interesting things in connection with the appointment by President Roosevelt of James L. O'Neill as acting administrator of the midget NRA.

First of all, there has been talk for a long while in the NRA corridors that Mr. O'Neill had been offered the job, but most of the executives left in that body thought that he would refuse to serve, even for a short time.

His leave of absence from the vice presidency of the Guaranty Trust Co., of New York, is to Sept. 1, but perhaps he too will have had enough by that time. Especially if he tries to sit around sweltering Washington like he did at his first press conference, with a vest and high stiff collar.

Mr. O'Neill for many years was connected with the Carnegie Steel Co., Pittsburgh, and is a Republican and not ashamed of it.

He has a very definite feeling that the administration has not yet given up all idea of getting some permanent NRA legislation from this present session of congress.

He must have got this pretty straight because he had just come from a long conference with the President when he talked with the newspaper men and was clear in his attitude on this question.

The new "acting" administrator, because Mr. O'Neill is strong for the word "acting," has not yet made enough of a survey to tell just what he will do about divisions at NRA, but he plainly indicated that as the voluntary codes come in—as they most certainly will—he will use as contacts with the industry the men who have already made contacts with the various industries under the old setup.

It it were not so comical it would be sad to see the actual rush there is in the various divisions of NRA for letters when they come in. From the deputy down to the office boy there is a regular center rush to get the letter and so perhaps find something to do. Many employes of NRA who are being kept on temporarily are finding out how much harder it is to do nothing than something.

Mr. O'Neill is considered an A-No. 1 personnel man and that is one of the reasons the President selected him for his present "acting" job.

MANGANESE GROUP STYMIED, REFUSES TO ADMIT DEFEAT

No one will ever accuse domestic manganese manufacturers of not being on the job. They have just had another setback, but they seem to keep everlastingly at it.

As the naval appropriations bill was passed by the house of representatives a paragraph was inserted authorizing the expenditure of $7,500,000, which was an unexpended balance alloted for naval construction, for the purchase of "strategic minerals." That was all.

However, there was an "understanding" between members of the naval affairs committee and "others"

that these "strategic minerals" consisted mostly of domestic manganese as well as tungsten and other minerals. As a matter of fact half of this sum was to be used for the purchase and storing up of domestic manganese ore.

However, the senate naval affairs committee threw this out when it reported the bill. The house still was not satisfied, and for two weeks held out in conference for the inclusion of this item, but has finally been licked.

BUSINESS COUNCIL CAN'T TAKE KIDDING; MEMBERS TO QUIT?

Since the NRA decision, in fact since the open criticism of the President by the chamber of commerce of the United States, fewer and fewer businessmen have crossed the portals of the White House office building.

There were indications early in the spring that the President would lean more heavily upon the business advisory and planning council set up by Secretary of Commerce Roper to advise him. It was this group that the President innocently persuaded to come over to the White House and stand at his elbow to prove that the chamber was not representative of business sentiment.

Last week it developed that a number of members of this council are about to resign, first, because their advice is never taken and, second, they are being "kidded" at home by their friends for their connection with the new deal.

A number of reports on important matters of administrative and legislative policy have been compiled by the council—not all of them favorable, which may be one clue to their obscurity. Hence, the prospect that a number of resignations will develop shortly, and not all of them from Republicans.

MATERIAL PROSPECTS IN ROAD PROGRAM KEEP DWINDLING

There is still considerable discussion in administrative circles regarding the amount of material and labor to be used under the work relief program, especially as to construction of roads and grade crossings.

The President has stressed the fact that his main objective is to put 3,500,000 men to work and let the rest of his program fit in with that. The peak of this work, he still believes, will be about Nov. 1.

Grade crossings he pointed out, will come to more than $1200 per man per year—which is about the sum he had allowed for that purpose. Concrete roads, with its reinforcing bars, he revealed will come to about $2500 per man per year instead of the $1200 allowed.

It is therefore uncertain at this time as to just how much grade crossing and road building work will be done, and in just what way. Suggestion has been made that more dirt than concrete roads will have to be taken care of under such a program.

There is a story going the rounds that the government officials who have been working on the roads program are a little disgruntled at the statements of the President on the amount of money to be used in this work per man per year with materials.

They have indicated that the President knew all along just what it would cost, and that he is not at all surprised. In fact, there is talk that propaganda has been set afoot to offset some of the statements he has made recently on this subject.

FTC POLICY ON TRADE PRACTICES UP TO PRESIDENT

An increasing number of inquiries is being received by the federal trade commission from various branches of industry regarding trade practice conferences.

Also, it is reported, that requests for such conferences have been received by the commission from a number of industries since the silencing of NRA.

As this is written, the commission has not adopted any new policy regarding these conferences, but it is entirely probable that the matter is now up for decision by the White House.

Pending any statement of policy, the commission is refusing to divulge the exact number—or the kind of industries making these inquiries.

Steel Founders on Code Standards

COMPLETING a two-day session of Steel Founders' Society of America in Cleveland, June 18 and 19, members of the industry reaffirmed their determination to retain those features of NRA which proved beneficial both to employes and management.

About 125 steel executives, representing directly or indirectly over 90 per cent of the productive capacity of steel castings, made slight changes in organization and structure necessary to continue as a trade association.

The Steel Founders' society was the code formulating body and after the approval of the code on Nov. 2, 1933, was recognized and continued to function as the administrative agency. Its governing body consists of a board of directors representing eight districts that will coninue to serve.

At the opening session, the sentiment of the industry was ascertained and the following resolution was adopted:

"Resolved that the representatives of the members of this industry here assembled pledge their respective companies to the maintenance of the labor provisions of the code of fair competition for the steel castings industry and declare that it is for the best interest of the industry that such provisions be so maintained throughout the industry, provided, however, that it shall be permissible to use 26 weeks as a basis for determining the average employment of not to exceed 40 hours per week as prescribed in the code."

In addition to the base wage and hour provisions contained in the code, recognized differentials in wage payments were reaffirmed by various members. With reference to fair trade practice and other provisions, details of operation by voluntary recognition of such principles were recommended.

Hail Co-operative Spirit

Numerous expressions contrasting the previous condition of the industry with standards of business practice which had been attained testified to the benfit of co-operative action. The maintenance of higher labor standards and the elimination of destructive competition were definitely credited to the co-operative spirit engendered in the industry by the code.

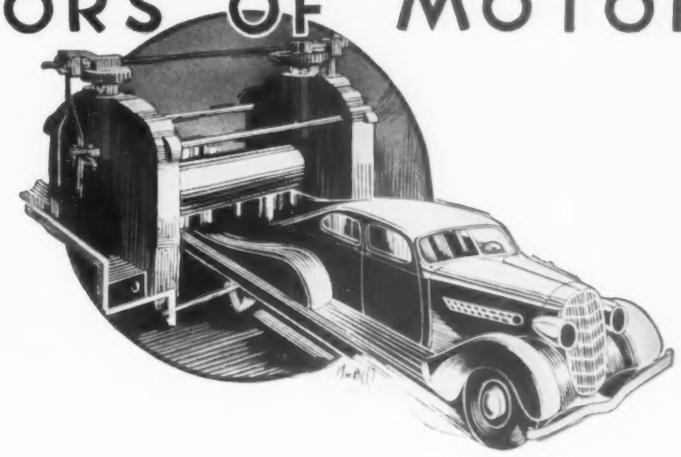
It was the consensus of opinion at the meeting that regardless of the invalidation of NIRA the steel foundry industry desires to maintain so far as it is permitted such business standards as were established under the code in the interests of the members of the industry, their employes and customers.

The office of the society will continue to gather and disseminate statistical information which has been found to be desirable and beneficial. It was not deemed practical to continue open price reporting, but statistical data concerning past closed transactions relating to production, distribution and marketing of steel castings in all phases was held to be desirable.

In the assembling of wage reports covering rates of pay and hours of labor, the service of field representatives has been found to be beneficial. Accordingly, such field men will be retained and also will be available for carrying on cost education work which is a valuable function of trade association activity.

Trade practices recognized as damaging, such as secret rebates, allowances, special concessions or other deviations from recognized practices as well as selling products below cost to the injury of a competitor, were condemned and disclaimed by members of the industry.

MIRRORS OF MOTORDOM



DETROIT

AUTOMOBILE manufacturers did such a fine job "selling" the steel body to the public and making steel synonymous with safety that it seemed logical to expect the steel top to be a pushover for 1936. But judging from the "knocking" some dealers in soft top cars have begun, this will not be so.

Fisher Body, it will be recalled, put the turret top this year on Olds, Pontiac, master Chevrolet, and recently LaSalle. The new Buicks and Cadillacs will have it, and presumably also the remainder of the Chevrolet line. Hudson-Terraplane replaced its soft top with steel.

As usual when something radical is introduced, other manufacturers initiated some experimental work and began to follow closely the actual road experience of the originators.

Nash developed a welded top and put it on its new 400 series, probably the forerunner to its adoption on all Nashes and Lafayettes. Several body makers practically matured a method for welding a top as an alternative to the more costly one-piece stamping. It looked as if a trend had been established.

Mud-Slingers Go to Work

Then, several weeks ago, stories critical of steel tops began spreading over the country. Some agencies for soft top cars began showing prospects a photograph of a steel top badly caved in. It was whispered that the maker of a steel top job had unsuccessfully offered $10,000 for one of its wrecks which was in hostile hands.

A good deal also began to be said about difficulties with radio reception and heat—although certainly in the northern states there has not been enough warm weather this year to make such an indictment stick.

The fact is, of course, that an accordion pleat may be put even in a steel top provided the impact is hard enough. Steel Pullmans have been wrecked and steel ships sunk. It probably would require a 2-inch plate to withstand any possible shock to a car.

What the backers of the steel top contend is that the safety of persons under identical accident conditions would be greater under a steel top than under a chicken wire-fabric one. Fisher Body claims that exhaustive tests in Florida last winter disclosed no handicap on account of heat. Putting aerials under running boards provides adequate radio reception in steel jobs, although wheel static eliminators are often recommended.

Take It and Like It

Manufacturers of steel top cars are not complaining because the automobile is a hard-hitting industry and by common consent almost anything goes. They are, of course, the least bit grim, but their grimness is tempered by the recollection that a prominent manufacturer once campaigned against four-wheel brakes. There may be some more modern Canutes.

The interest to steelmakers is not the origin of these knocks but the extent to which they will put a dent in the steel market for 1936. It may be assumed that, with making no indictment that a campaign is being fostered, dealers would not be talking against the steel top if they were not sure they will not have to eat their words next year.

By way of a slant on the market prospect for steel, the steel top Hudson-Terraplane puts on its coupes weighs 10 pounds, the 2-door sedan 21 and the 4-door sedan 23. There are, of course, variations according to models, and a small scrap loss in fabricating. The Fisher turret top is slightly heavier. If Ford had gone to a steel top this year the 800,000 cars he is assembling in the first half year would have required upward of 8000 tons of sheets.

A roll call on the top situation shows all General Motors lines retaining steel for 1936. Nash and Lafayette will be in line. Nothing is confirmable concerning Ford and Lincoln at this time, but the gossip is that the new small V-12 Lincoln, probably out this fall, will have a steel top, the forerunner of its adoption by Ford. Briggs is supposed to be doing the experimental work.

Chrysler, it is definitely understood, will not go to a steel top next year. Studebaker seems committed to the soft top. If any of the small-volume lines which cannot afford the presses and dies for a one-piece top wish to, they can specify welded tops from any of several body and parts makers.

On the whole, more steel will be required for steel tops for 1936 models than for 1935, but at this time the prospect is that the switchover will be slower than seemed probable some weeks ago. Perhaps some competing material will be pushed. In any event, some automobile manufacturers who have been crowing over all-steel bodies may have to temper their claims.

Policies Change Overnight

It must be taken into consideration that automobile manufacturers sometimes make decisions and embark on marketing policies for oblique reasons.

Last winter Fisher Body experienced pronounced difficulties, especially on Chevrolet, in getting its turret top into quantity production. While the labor situation appears quiet now, a comparatively small group of employes could close the windpipe of production. Hence some manufacturers may be holding model changes to a minimum for 1936 in order to avoid a tieup at the beginning of what promises to be a lush market.

And as the industry operates, it can take a definite stand for years on a body or engineering policy, then reverse itself overnight. It is possible that two years hence those now having the deepest reservations on steel tops may be singing their praises loudest.

Those manufacturers have made the most money who, seeing a model was not going over, have ditched it and turned to something new immediately.

Speaking of claims, there is a good deal of discussion within the automobile industry whether streamlining has been pushed too far on professions of economy and not sufficiently for inherent beauty.

The fact seems to be that any economy in streamlining is not apparent at low speeds. The ideal combination is high speed into a head wind, which in most parts of the United States would require owners to drive 50 miles or faster per hour toward the west or southwest. At 50 miles per hour heading west the fuel economy of radical streamlining seems to be about 1 per cent, and at 70 miles 2 per cent.

Man's standard of beauty and utility necessarily being derived from nature, some automobile engineers have turned to the moving things in nature for a pattern. From the bird has come the basic design—wings and fuselage—of the airplane. However, more adaptable to road conditions is the form of the fish. Visualize the top line of a fish and note the general resemblance in the top lines of many streamlined cars.

A fish, of course, is equally streamlined on the bottom. Here is the great difficulty for designers. No matter how much top and side lines are treated, tremendous drag still is exerted between highways and bottoms of cars. Unfortunately a bottom pan would not be practical, inasmuch as cars require servicing on the bottom, and fish, so far as is known, do not.

Assemblies Still at Top

While opinions may differ in regard to steel tops and the basis on which to sell streamlining, production remains on a level highly satisfactory for the season. Last week, according to *Cram's Reports*, assemblies totaled 90,586 units, which was only 202 fewer than in the preceding week.

Ford, still operating five days a week, two shifts, was off about 2000 jobs to 24,000. An unusually large crop of rumors concerning Ford has broken loose.

One is that Ford, having mopped up the present low-price field handily this year, is preparing to ride the crest of a further upswing in business next year by doing something spectacular and radical—perhaps the long-rumored 4-cylinder $350 car he is supposed to have developed several years ago.

Another report that has gained wide currency in Detroit relates to rear engine mounting. It can be said that recently, at least, no serious experimental work in this direction has been undertaken. There may be some connection with the special Ford racing cars built for the Indianapolis races. These specials were front wheel drive and the engine was reversed in mounting. Four qualified, and a fifth as an alternate, and while none finished the showing for these jobs was creditable.

A further development in regard to the new wheels Ford contemplates using next year has them a casting, possibly a border line between steel and gray iron, with the wheel, hub and brake drum all in one piece. A Detroit wheel maker is installing a foundry department, ostensibly for Ford business.

Last week it was reported here that the new Ford wheels would be pressed steel, probably with a stainless hub, and that this stamping would provide an additional outlet for the strip to be rolled on the new continuous mill at the Rouge, which will be turned over sometime in August.

General Motors production last week at 38,900 units represented an increase of almost 2000, largely due to Chevrolet trying to meet backed-up demand for the master model. Olds production remained steady at 4400, Pontiac at 3750, and Buick at 1900, while Cadillac-LaSalle was off a little to 500 units.

Fisher Body has such a large program of die work, chiefly on account of the complete redesign of Buick and Chevrolet, that it has done the unusual thing of placing considerable die work outside.

It seems certain that when all General Motors models for 1936 are introduced they will be equipped with hydraulic brakes, from Chevrolet to Cadillac.

Both the new Buick and Chevrolet radiator grilles will be radically revised, and at least Buick's will be die cast. The new Buick is expected to have a top speed over 90 miles.

Chevrolet is in the midst of a used car campaign, using 5000 newspapers to stress its "red tag" guarantee.

Detroit had a sinking feeling about Hupp last week when it learned that a stockholders' protective committee had been organized in New York on the ground that about 1,000,000 shares of Hupp's stock are not fairly represented on the present board.

Following recent turmoil, Hupp appeared to have settled down under the management of President Drum and employes were again reckoning the company's life beyond one payroll period.

Hupp production last week was approximately 400 units, or double the rate of a year ago. Its assemblies have been increasing due to a bank of unfilled orders. Beginning about July 1 Hupp bodies will come equipped with trunks.

Detroit's hope for another steel mill was dashed last week when the American Rolling Mill Co. broke ground at Middletown, O., for a new wide cold reducing mill. For several years American Rolling Mill has had under option a 158-acre site near Trenton, Mich., and the appropriation of $3,500,000 for a mill revived the expectation of construction there.

A revived Franklin Motors Inc., Syracuse, N. Y., expects to have an air-cooled car on the market again about Nov. 1.

Briggs Mfg. Co. has leased the former Graham plant at Evansville, Ind., to build bodies for the Plymouth assembly plant being opened there. Production of 300 bodies daily is scheduled to begin Dec. 1.

Automobile Production

Passenger Cars and Trucks—U. S. Only
By Department of Commerce

	1933	1934	1935
Jan.	128,825	155,666	292,817
Feb.	105,447	230,256	335,699
Mar.	115,272	338,434	429,834
Apr.	176,432	352,975	477,716
May	214,411	330,455	*425,000
5 Mo.	740,387	1,407,786	*1,961,066
June	249,727	306,477	.....
July	229,357	264,933	.....
Aug.	232,855	234,811	.....
Sept.	191,800	170,007	.....
Oct.	134,683	131,991	.....
Nov.	60,683	83,482	.....
Dec.	80,565	153,624	.....
Year	1,920,057	2,753,111	.....

*Estimated.

Estimated by *Cram's Reports*

Week ended:	
June 1	65,675
June 8	87,755
June 15	90,788
June 22	90,586

New Capacity

GEORGE M. VERITY, chairman, American Rolling Mill Co., broke ground June 20 for an extension to the East Works at Middletown, O., to house a new 72-inch cold reducing mill, costing $3,500,000.

The mill, included in the recent financing program, is in response to automotive industry requirements for wider sheets. Approximately 150 men will be required to operate it.

For breaking ground Mr. Verity used the same silver spade that turned the first shovelful of earth for the original works.

Labor

JONES & LAUGHLIN STEEL CORP. employe elections June 20 found 8735 votes cast at Aliquippa, Pa., out of 8901 eligible, and 6243 cast out of 6372 eligible at the Pittsburgh works, or 98 per cent voting.

Steel Seller Points Way to Tariff Control of Imports

A REMEDY to protect American manufacturers against the competition of cheap and trashy foreign goods while at the same time doing justice to meritorious imported products is offered by C. H. Macdonald, vice president of the Colorado Fuel & Iron Products Co., Denver.

The cure lies, he says, in a tariff flexibily administered to exclude low-grade goods but to allow high-grade products entry, providing a revenue, giving the foreign manufacturer a profit and at the same time not underselling competitive American products.

From Japan comes a flood of imitative goods, made by cheap labor and superficially attractive, but of poor quality. From Europe flows another stream of similar goods, and also a tide of meritorious products, possessing high quality and competing on the same plane with American goods, except for the item of labor cost. Mr. Macdonald says:

"It is obvious that if this great European-Oriental dumping organization were not permitted, even encouraged, to use American channels of distribution to broadcast their products of starvation labor throughout America, their success would be short-lived.

Patriotism vs. Profits

"With all due respect for the best of us, patriotism has no effective or lasting appeal to the merchant who sees his trade dwindling because the man across the street allies himself with European producers fattening themselves at the expense of American manufacturers, merchants, farmers and workingmen.

"The wholesaler stands out against it for a while; then, generally on the plea of his salesmen, stocks a small quantity of low-priced foreign material. The salesmen are instructed not to offer this material, not to attempt to sell it; but merely to accept orders where the dealer demands it to meet competition.

"Salesmen are human and, following a most human characteristic, take the line of least resistance. Consequently, every trade survey shows that it is only a question of time when they are selling cut-price foreign junk in preference to American products; for just one reason, it is easier to sell.

"Should we establish a protective tariff against all competitive merchandise; a tariff so high that these countries cannot dump their output here at ruinous prices? Essentially, yes. That, however, would only partially meet the problem.

"Only rank provincialism, national narrow-mindedness or shortsightedness, would ask or endeavor to exclude from any country or state, the products of another. When such products are admitted, however, and sold at destructive prices because the exporting country, by virtue of an incomparably lower standard of living, can produce them immeasurably cheaper, no place should be made in any country for such merchandise.

"Anyone can enumerate several foreign products which have invaded our markets, many of them selling for more money than competitive American products, and still holding their own after a quarter of a century or more.

"Without stopping to think, several flash into mind: Lea & Perrins Worcestshire sauce; Brand's A-1 sauce; the entire line of Cross & Blackwell, all from England; Ripolin enamel, a product of Amsterdam, Holland, sold for years in enormous quantities at double the price of the best American product. The list runs into thousands of items and hundreds of industries, presenting well-made, valuable foreign mechandise, developed and maintained at a high standard of quality and price.

"So in Paris, London and other European cities we find American shoes, rubbers, machinery, tobacco products, fruits, canned goods and a thousand and one other products, millions of dollars worth annually, selling steadily and for more money than European products.

"Such competition offers no valid reason for complaint from any country; but dumping, chiseling, scamping from without or within should by every individual and organized effort possible, be ruthlessly crushed and stamped out when and wherever its crawling principals or representatives appear.

"Against the flood of trashy poor-value-at-any-price merchandise a flat duty per article, such as a toothbrush, a doll, etc., should be assessed at port of entry; a charge so high as to make these articles undesirable at any price at which they could be sold. On all other merchandise, of value comparative with the same character of product made in America, a flat duty or ad valorem charge should be made, a duty sufficiently high to substantially increase government revenue; but still, with their lower production cost in mind, allow foreign manufacturers a fair return on the American sale price. On that basis any good competitive foreign product should be accepted gladly.

Use Duty as Warning

"Whenever such products, however, are shown to be disturbing fair price levels of competitive American merchandise, the assessed duty upon these specific articles should be immediately increased so sharply as to give unquestionable warning and create an effective check upon its continuance.

"Protective measures along such lines would constitute no excuse for irritation or retaliatory measures from any foreign country to which we may now export American merchandise. Should foreign countries have cause for similar action, it is to be hoped that the products of our American cheap John chiselers (and we have plenty of them) will be duly and properly soaked.

"Abundant evidence has been presented to the treasury department at Washington during the past few

Convention Calendar

June 24-28—American Society for Testing Materials. Thirty-eighth annual meeting at Book-Cadillac hotel, Detroit. C. L. Warwick, 260 Broad street, Philadelphia, is secretary.

Aug. 19-23—American Foundrymen's association. Thirty-ninth annual convention at Royal York hotel, Toronto, Ont. C. E. Hoyt, 222 West Adams street, Chicago is secretary.

Sept. 11-21—National Machine Tool Congress (Third). In Cleveland, under auspices of the National Machine Tool Builders' association; Machine Shop Practice division, American Society of Mechanical Engineers; and Production Activity division, Society of Automotive Engineers. Herman H. Lind, 1220 Guarantee-Title building, Cleveland, is general manager, National Machine Tool Builders' association.

Sept. 11-21—National Machine Tool Exposition (Third). In Public Auditorium, Cleveland, under auspices of the National Machine Tool Builders' association. Roberts Everett Associates, 225 West Thirty-fourth street, are managers.

Sept. 18-20—National Industrial Advertisers association. Annual convention in William Penn hotel, Pittsburgh. Allan E. Beach, Littleford Bros., 453 East Pearl street, Cincinnati, is secretary.

Sept. 24-26—Association of Iron and Steel Electrical Engineers. Annual convention and exposition in Pittsburgh. T. B. Little, Empire building, Pittsburgh, is acting managing director.

Sept. 30-Oct. 4—American Institute of Mining and Metallurgical Engineers. Fall meetings of Iron and Steel and Institute of Metals divisions in Chicago. John T. Breunich, 29 West Thirty-ninth street, New York, is assistant secretary.

Sept. 30-Oct. 4—American Society for Metals. Seventeenth annual National Metal congress at Palmer House, Chicago. W. H. Eisenman, 7016 Euclid avenue, Cleveland, is secretary.

Sept. 30-Oct. 4—American Welding society. Fall meeting in Chicago. M. M. Kelly, 33 West Thirty-ninth street, New York, is secretary.

Sept. 30-Oct. 4—National Metal exposition. Seventeenth annual, in International Amphitheater, Chicago. W. H. Eisenman, 7016 Euclid avenue, Cleveland, is general manager.

years, showing the ruinous effects of deliberate dumping by German and Belgian steel groups; notwithstanding which absolutely nothing has been done to afford relief to hard-driven American manufacturers and merchants whose federal taxes steadily increase, with proportionally diminishing profits.

"Hundreds of pleas have been presented to Washington on this subject by individual firms who have spent much time and money obtaining evidence and data. All fruitless. It is quite probable, however, that a determined delegation representing the vote-getting or vote-killing power of the combined forces of organized labor, plus the national manufacturers' wholesale and retail associations, including hardware, textiles, lumber, steel, mining, machinery, agriculture etc., representing more than two hundred and fifty thousand sections of the backbone of American business and several million of their employes, might thoroughly awaken some of these Rip Van Winkles who sleep by the Potomac."

Calumet Now Borg-Warner Subsidiary

ALL of the capital stock of the Calumet Steel Co., of Chicago Heights, Ill., has been purchased by Borg-Warner Corp., Chicago, and the former now operates as a separate Borg-Warner subsidiary.

Roy C. Ingersoll is the new president of the Calumet company; he is a director of Borg-Warner Corp. and president of the Ingersoll Steel & Disc Co. division of Borg-Warner Corp.

Roy C. Ingersoll

F. G. Carrel, formerly secretary of Calumet, is vice president, and Mathew Keck secretary and treasurer.

Directors of the Calumet company are R. C. Ingersoll, F. G. Carrel, S. L. Ingersoll, Frank Matthiessen and C. S. Davis.

It is contemplated that in the near future the membership of the board will be enlarged to include, with others, Harold G. Ingersoll.

R. C. Ingersoll and his brothers Harold and Stephen, both vice presidents of the Ingersoll Steel division and directors of Borg-Warner Corp., are carrying on the tradition of their father, S. A. Ingersoll, who founded the Ingersoll company more than 50 years ago.

H. G. Ingersoll operates the Ingersoll plant at New Castle, Ind., and S. L. Ingersoll was the originator of the IngAclad stainless clad steel, an Ingersoll product. A large Ingersoll mill is also located in Chicago.

Mr. Carrel has been an officer and active in the management of the Calumet company for 21 years and was the organizer of the Rail Steel Bar association, of which organization he has been an active director and has supervised the Chicago office of that association.

The Calumet company will continue to manufacture steel bars, shapes and various products rolled from standard section tee rails, and axle steel.

The plant of the Calumet company is in Chicago Heights, where it has been since the company's inception in 1907. General offices and sales offices are located in Chicago at 20 North Wacker drive.

F. G. Carrel

Founders Hold to Code Principles

TWO general industry meetings of the Malleable Founders' society, at which 90 per cent of all malleable foundries were represented and their composite total tonnage was 95 per cent of the annual volume of malleable castings, were held recently, one in Chicago, June 12, and the second in New York, June 13.

Purpose was to determine whether the industry wished to continue the society in the furtherance of co-operative action in the industry. It was decided unanimously that the society should be carried on, that it should maintain a field service devoted to inspection of member plants in matters relating to labor, promoting the use of uniform costs and investigating any variations from recognized trade practices.

Resolutions were adopted that individual members of the industry, acting voluntarily during the present uncertainty, should maintain the rates of pay, hours of labor and standards of competition enunciated in the malleable industry ex-code.

It was decided to retain all features of the code, with the exception of the schedule of fair and reasonable costs of production. Further, individual foundries, if they wish, may publish or file individual prices on such malleable products as may be subject to sales on a price list basis.

Sentiment of both meetings favored the 40-hour week, but that this might be averaged to permit an excess of 32 hours in each 6 months' calendar period when peak requirements require such deviation, in the latter case the maximum week being 48 hours.

Individual employers will continue to report monthly wage and hour standards classified by individuals, and character of employment. Further, a check will be made on complaints arising from alleged trade practice violations, and educational work will be conducted in improvement of cost prices.

Wellsville Works May Go

American Sheet & Tin Plate Co. is considering dismantling its Wellsville works, Wellsville, O.—a sheet mill works built in 1873 and comprised of ten hot mills for making black sheets and 16 cold stands. The mill's capacity is 52,000 tons annually of 24 to 48-inch widths in No. 10 to 30 gage. The works has not been operated for some time.

Industrial Men in the Day's News

COL. V. A. ROOT has been appointed sales manager of the Seneca Falls Machine Co., Seneca Falls, N. Y., lathe manufacturer. He will have charge of sales and advertising. Prior to his new association, for many years he was sales manager for W. F. & John Barnes Co., Rockford, Ill.

Joseph H. Flather has been named chief engineer for the Seneca Falls company. Formerly he was president of the Flather Co., Nashua, N. H.

George E. Fogarty, European sales manager for the company, who has been in this country for several months, is returning to his headquarters in Paris, France.

♦ ♦ ♦

E. J. McDonnell has been appointed vice president of the industrial division of Blaw-Knox Co., Blawnox, Pa.

L. A. Prescott has been appointed vice president of the Blaw-Knox engineering division. Both new executive positions were created with these appointments.

♦ ♦ ♦

J. K. Baylis has been appointed manager of sales in the Buffalo district for Bethlehem Steel Co. Associated with Bethlehem since 1927, he

J. K. Baylis

went to the Buffalo district as sales agent in charge of structural and plate sales, and has been acting manager of sales there since Jan. 1. In earlier years he was active in sales work for the Carnegie Steel Co., Midvale Steel & Ordnance Co. and Donner Steel Co.

♦ ♦ ♦

Harold L. Geiger, since 1929 chief metallurgist for the Wisconsin Steel Co., a subsidiary of International Harvester Co., and prior to that associated with operating and metallurgical departments of Inland Steel Co., has been appointed to the field staff of the development and research department of International Nickel Co. Inc., New York. For the present he will make his headquarters in the Detroit office of the company, General Motors building. Later he will transfer to New York.

♦ ♦ ♦

J. G. Carruthers, vice president of the Otis Steel Co., Cleveland, since early this year, and from 1922 until this year general manager of sales, has resigned, effective at once. Prior to joining Otis, he was associated with Illinois Steel Co., Chicago, and with Carnegie Steel Co. at Cincinnati.

Paul B. Allen, who succeeded Mr. Carruthers as general manager of sales for Otis Steel, has been appointed vice president in charge of sales.

Howard E. Robinson, formerly general manager of sales of the Newton Steel Co., Monroe, Mich., has been named general manager of sales for Otis at Cleveland, succeeding Mr. Allen.

♦ ♦ ♦

David H. Cohen, D. H. Cohen Inc., St. Louis, has been re-elected president of the St. Louis chapter of the Institute of Scrap Iron and Steel. Other officers include: First vice president, Gus Gillerman, Gus Gillerman Iron & Metal Co., St. Louis; second vice president, C. C. Cohen, I. J. Cohen & Son, Kansas City, Mo.; third vice president, Jack R. Forcheimer, St. Louis; secretary, Fred Fuld, Harry Benjamin Equipment Co., St. Louis; and treasurer, I. Bierman, F. Bierman & Sons Metal & Rubber Co., St. Louis.

♦ ♦ ♦

Sidney Langston, 438 Penton building, Cleveland, has been appointed representative in northern Ohio and western Pennsylvania for

Howard Linn, Superintendent of Strip Mill, McDonald Works, Carnegie Steel Co.

Born and educated in Pennsylvania, he has been active in mill operating departments since 1927.

Only 35, he has made rapid rise from his first position as laborer in Weirton Steel Co.'s 48-inch mill.

He now takes charge of a new 42-inch strip mill which Carnegie is building at Youngstown, O.

HOWARD LINN who as noted in STEEL for June 17 has been appointed superintendent of the new 42-inch strip mill which Carnegie Steel Co. is building at its McDonald works, Youngstown, O., has served since 1928 as night superintendent of the 48-inch hot strip mill of Weirton Steel Co., Weirton, W. Va.

Born in Collier township, Pennsylvania, in 1900, he received his education at the University of Pittsburgh, where he was graduated with a bachelor of science degree, later spending four years there in engineering work.

He was employed by Superior Steel Corp. at its Carnegie, Pa., works for a brief time in 1914, but regularly began his business career in 1927 as a laborer in the 48-inch mill at Weirton Steel. Shortly afterward he was appointed a foreman in the mill, and in November, 1927, assistant day superintendent. A year later he was named night superintendent.

the J. K. Smit & Sons Inc., manufacturer of diamond pointed tools for industrial purposes.

♦ ♦ ♦

W. W. Coleman, president of the Bucyrus-Erie Co., South Milwaukee, Wis., has returned from Europe after a stay of several months, during which time he attended the annual meeting of the company's British affiliate, Ruston-Bucyrus Ltd.

♦ ♦ ♦

F. J. Laskey, formerly purchasing agent at Monroe, Mich., for the Newton Steel Co., has been appointed director of purchases for Corrigan, McKinney Steel Co., Cleveland, and its subsidiaries, including Newton Steel and the N. & G. Taylor Co., Cumberland, Md.

♦ ♦ ♦

J. W. Barnett, recently director of the division of construction and finance of the United States shipping board, on July 1 becomes associated with the marine department of Babcock & Wilcox Co., New York. A graduate of the United States naval academy in 1908, later he was associated with the Lake Torpedo Boat Co. and Marion Steam Shovel Co.

♦ ♦ ♦

R. T. Palmer, 883 Farmington avenue, West Hartford, Conn., is now handling sales of cutters manufactured by the Ingersoll Milling Machine Co., Rockford, Ill., territory including New England and northeastern New York.

J. A. Bouslough, 606 North avenue, Wilkinsburg, Pa., has charge of sales of Ingersoll cutters in eastern Ohio and western Pennsylvania.

♦ ♦ ♦

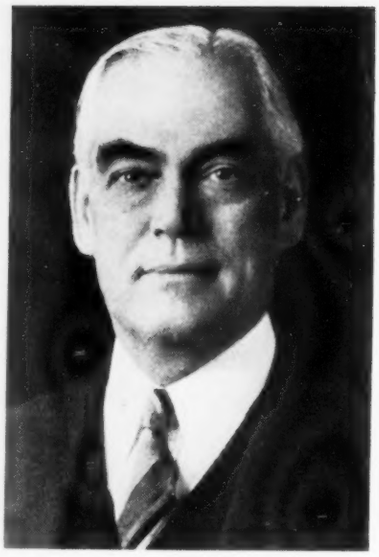
F. E. Gardner has resigned as vice president and a director of the Gardner Machine Co., Beloit, Wis., maker of grinders and abrasive tools, after being with the company 30 years. He will now be active as a consultant on special engineering problems.

W. B. Leishman, with the Gardner company 22 years, most recently as secretary, has been elected vice president and treasurer. He is succeeded as secretary by Ingle R. Shue, associated with the company since 1917, and also head of the abrasives division.

♦ ♦ ♦

Charles R. Robinson, vice president in charge of railroad sales department of Inland Steel Co., Chicago has been named first vice president and general manager of sales, succeeding the late Edward M. Adams. Mr. Robinson was associated with Inland from 1904 to 1908, and from 1922 until the present. He is a director, and also president of the Inland Tar Co., a subsidiary.

He started his career in 1890 as a salesman of tool steel for Park Brother & Co. In 1900 he entered business for himself, handling various steel products on a brokerage



Charles R. Robinson

basis. A salesman for Inland in 1904, in 1906 he became assistant general manager of sales, leaving in 1908 to become Chicago district sales manager for the Lackawanna Steel Co. In 1910 he transferred to New York in the post of general manager of sales for Lackawanna Steel, later moving to Buffalo. He was elected vice president in charge of sales in 1918, and in 1922 rejoined Inland, coincident with that company's entrance into the rolling of standard section heavy tee rails.

♦ ♦ ♦

O. E. Romig, for the past five years metallurgist in the Gary, Ind., sheet mills of American Sheet & Tin Plate Co., has been appointed manager of the electrical sheet division of the company at its general offices in the Frick building, Pittsburgh. Prior to his position at Gary he was associated with the research laboratory of the company at Pittsburgh and with the Vandergrift, Pa., works of the company.

James P. Barton has been appointed sales engineer in the electrical sheet division of Sheet & Tin Plate, formerly being associated in a similar capacity with the Empire Sheet & Tin Plate Co., Mansfield, O. Other previous associations include the Westinghouse Electric & Mfg. Co., Springfield, Mass., and General Motors Radio Corp., Dayton, O.

Died:

FRANK H. STREINE, well known designer and builder of metal finishing machinery and head of the finishing machinery division of Mackintosh-Hemphill Co., Pittsburgh, in Zanesville, O., June 15, from injuries received in an automobile accident. For many years he was vice president and general manager of Streine Tool & Mfg. Co., New Bremen, O., and only recently (STEEL, May 20) was appointed to his new position with Mackintosh-Hemphill.

♦ ♦ ♦

Walter S. Shepard, 56, auditor for the Hendrie & Bolthoff Mfg. & Supply Co., Denver, June 5.

♦ ♦ ♦

J. W. Chandler, Louisville, Ky., representative for the Union Spring & Mfg. Co., New Kensington, Pa., June 12.

♦ ♦ ♦

Robert L. Ottke, 46, vice president of Standard Sanitary Mfg. Co., Pittsburgh, in that city June 14, as a result of injuries received in an automobile accident.

♦ ♦ ♦

J. Polk Tarwater, 63, president of the Rockwood Stove Works, Rockwood, Tenn., June 17. He was also head of the Harriman Hosiery Mill at Harriman, Tenn.

♦ ♦ ♦

Frank P. Knowles, 82, director and member of the executive committee, Crompton & Knowles Loom Works, Worcester, Mass., in Auburn, Mass., June 13. Before retiring in 1916, he was connected with the textile equipment manufacturing firm for 30 years in the sales department.

♦ ♦ ♦

W. T. Snyder, 55, manager of industrial relations at McKeesport, Pa., for National Tube Co., Pittsburgh, and an employe of that company for the past 40 years in McKeesport, June 18. Previously he had been electrical superintendent, superintendent of power, and construction superintendent.

♦ ♦ ♦

Frank B. Smith, 85, veteran lake shipping and railroad executive, in Lakewood (Cleveland), June 18. From 1865 to 1892 he was associated with the Northern Transportation Co., later becoming chief engineer for the Lake Superior Iron Co. When the Pittsburgh Steamship Co. was organized he was named first assistant chief fleet engineer and when the late Harry Coulby became president Mr. Smith was chief fleet engineer. He retired in 1920.

♦ ♦ ♦

Walter F. Dixon, 70, works manager of the Singer Mfg. Co., Elizabethport N. J., and vice president of the Diehl Mfg. Co., electric division of the Singer company in Plainfield, N. J., June 18. Born in London, he came to this country as a young man. Serving for a time as mechanical engineer at the Rogers Locomotive Works, Paterson, N. J., later he was appointed manager and chief engineer of the locomotive department of the Sormobo Works in Russia. From 1900 to 1917 he managed the Singer company's plant in Podolsk, Russia, returning to this country in 1918 as special representative in New York.

EDITORIAL

Put Homes on Par with Autos As Market for Steel!

SIGNS of a marked improvement in the volume of residence construction now are unmistakable. Anyone who travels extensively must be impressed with the number of homes being erected in the outer fringes of many cities and towns. The real estate columns of daily newspapers are graced with more illustrations of newly completed houses than have been published since predepression days.

These appearances of heightened activity are confirmed by the statistics of the F. W. Dodge Corp. A comparison for the first four months of 1934 and 1935 is enlightening:

RESIDENTIAL CONSTRUCTION

	No. of Projects		1000 Sq. feet		Value, $1000	
	1934	1935	1934	1935	1934	1935
January	1,730	2,900	3,943	5,528	$15,110	$22,410
February	1,965	2,964	3,634	4,569	14,520	16,617
March	2,962	4,732	8,046	8,809	28,076	32,209
April	3,596	6,098	5,985	11,925	22,686	12,281

The gains are due to a combination of circumstances, chief of which are an unquestioned shortage of homes, the assistance for long term financing offered by FHA, and the strong appeal of improved design, construction and additional comforts which are embodied in modern homes.

Considering the depths to which home building descended during the dark days of 1932 and 1933, the current moderate comeback is heartening. Architects, builders and others who study the conditions affecting residence construction closely are convinced that the present revival is but a feeble forerunner of a period of substantial activity which will be necessary in the next few years to meet the demand for adequate homes.

Revival in Residence Construction Means Much To Iron, Steel and Metalworking Industries

Strangely enough, only a few executives in the iron, steel and metalworking industries seem to have sensed the significance of this pending expansion in residence construction. It means more in market potentialities to the metal industries than any previous spurt of building activity. In fact, its ultimate capacity for consuming steel and kindred metal products probably is greater than the present much publicized consuming ability of the automobile industry.

According to census reports, there are slightly more than 30,000,000 families in the United States. The total number of structures has been figured at about 29,000,000, of which between 25,000,000 and 26,000,000 belong under the bureau of census definition of dwellings. Automobile registrations number roughly 25,000,000. On the basis of these approximate figures, one is justified in concluding that the family units of the United States, on the average, are better equipped with motor car transportation than with adequate homes.

This statement is a compliment to the automobile industry on one hand and a direct challenge to the building construction interests on the other. More than that, it reveals an unbalanced economic and social condition which must be corrected before this nation can achieve the high standard of wholesome living to which its people aspire.

Problem of Building Industry Is To Adapt Product to Mass, Low-Income Market

The American public will build comfortable, modern homes even more enthusiastically than it has purchased automotive transportation just as soon as the dollar will buy as much value in a home as in a motor car. The problem now confronting the building industry is exactly that which faced the automobile builders a few years ago. It is the problem of making the product so attractive in quality, price and terms that prospective buyers cannot afford to be without it.

To meet this challenge successfully, home builders must adapt their dwellings to the mass, low-income market just as Henry Ford, Walter Chrysler and Alfred Sloan co-ordinated their V-8's, Plymouths and DeSotos, and Chevrolets, Pontiacs and Oldsmobiles to virtually the same market. It means better organization; closer cooperation between architect, material producer, builder and financier; greater technical development; more market development consciousness; and higher labor efficiency than has characterized the building industry in the past.

Where can the iron, steel and metalworking industries hope to find a better market opportunity than this? Without unduly stressing the use of steel construction, each dwelling represents a potential outlet from two to eight tons of steel. In addition, the heating, air conditioning, cooking, sanitary and other accessory equipment calls for a substantial amount of ferrous and nonferrous materials.

The present revival of home construction should be the signal for industry to capitalize upon its opportunities in this promising field. The reward for alert, intelligent participation in the rehabilitation of American housing will be well worth while.

THE INDUSTRIAL DIAL

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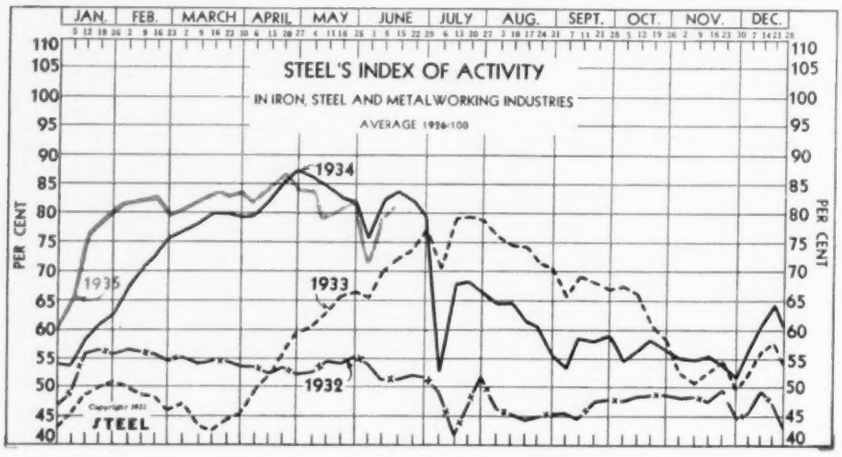


STEEL'S *index of activity in the iron, steel and metalworking industries gained* 1.0 *points to* 80.3 *in the week ending June* 15:

Week ending	1935	1934	1933	1932
April 6	83.4	79.6	49.1	52.6
April 13	85.4	82.2	52.6	53.4
April 20	26.3	85.0	55.8	52.3
April 27	84.9	87.5	59.5	52.5
May 4	84.6	86.0	60.3	54.7
May 11	79.3	84.4	62.5	54.3
May 18	80.5	82.4	65.2	55.1
May 25	82.8	81.9	66.1	54.2
June 1	71.9	75.7	65.3	51.0
June 8	79.3†	82.3	69.9	51.1
June 15	80.3*	83.6	72.1	51.8

†Revised. *Preliminary.

The index charted above is based upon freight car loadings, electric power output, automobile assemblies (estimated by Cram's Reports) and the steelworks operating rate (estimated by STEEL*). Average for* 1926 *equals* 100, *weighted as follows: Steel rate* 40, *and car loadings power output and auto assemblies each* 20.

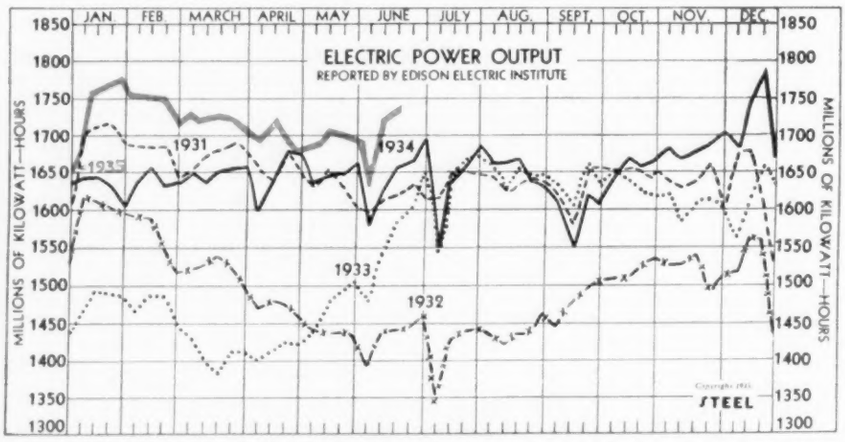
Industrial Activity Steady as First Half Nears End

BUSINESS has just demonstrated unusual ability to withstand major shocks to the country's political—economic structure. During the past month, when national attention has been focused upon the problem of adjusting federal policies to the requirements of the Supreme Court decisions of May 27, business has maintained a steady gait. During the period, the fluctuations which have occurred have been traceable more to seasonal influences than to the effect of undue confusion in Washington.

The sudden abandonment of the enforcement features of NIRA has not yet brought the state of chaos which was freely predicted in some quarters. Thus far industry generally has held intact its code wage, hour and price structures. Judging from the discipline which has been maintained during the past few weeks, the shift away from the routine of code compliance may develop gradually and with less than expected confusion. If the transformation from code regulation to a more natural condition can be engineered smoothly the way will be paved for industry to reap the long-term benefits of the Supreme Court's rulings.

Another favorable development of the month

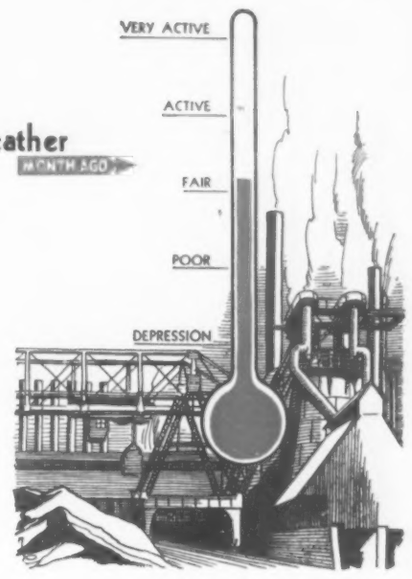
Million Kw.-Hr. 1935	
June 15	1,743
June 8	1,724
June 1	1,629
May 25	1,696
May 18	1,700
May 11	1,701
May 4	1,698
Apr. 27	1,673
Apr. 20	1,701
Apr. 13	1,725
Apr. 6	1,700
Mar. 30	1,712
Mar. 23	1,824
Mar. 16	1,728
Mar. 9	1,724
Mar. 2	1,734



Million Kw.-Hr. 1934	
June 16	1,665
June 9	1,655
June 2	1,576
May 26	1,655
May 19	1,649
May 12	1,643
May 5	1,632
Apr. 28	1,669
Apr. 21	1,673
Apr. 14	1,642
Apr. 7	1,616
Mar. 31	1,665
Mar. 24	1,658
Mar. 17	1,650
Mar. 10	1,647
Mar. 3	1,658

was the initial gesture on the part of at least three nations toward monetary stability. With the help of the United States and England, France averted a crisis and again postponed its threatened departure from gold. The unheralded action of the rescuers is reassuring evidence that the financial advisers of the leading powers at last are ready to move to sounder ground on financial policy.

Industrial activity in June receded moderately from the levels of April and May. Automobile output expanded modestly from week to week, following the interruptions of May. Steelworks operations tapered off gradually. Electric power output continued at high levels and revenue freight traffic, helped by a renewed threat of a coal strike, touched new highs for the year in the weeks ending June 8 and 15. STEEL's index of industrial activity touched 80.3 for the week ending June 15.



Where Business Stands

Monthly Average, 1934—100

	May, 1935	April, 1935	May, 1934
Steel Ingot Output	118.6	123.4	152.9
Pig Iron Output	127.8	127.2	151.5
Freight Movement	97.6	97.3	102.0
Building Construction	.....	157.2	115.4
Automobile Output	223.3	200.9	145.3
Wholesale Prices	106.7	105.5	98.5

July should provide a hint as to the probable trend for the second half. If industrial activity avoids the sickening nose dive which characterized the end of the second quarter in 1934 (as it probably will), that fact should augur for an early uptrend in the fall.

A substantial improvement in the general average of industrial activity in the second half of 1935 would represent a reversal of the trends for six consecutive years. The last substantial summer or fall rise occurred in 1928.

The Barometer of Business

Industrial Indicators

	May, 1935	April, 1935	May, 1934
Pig iron output (daily average, tons)	55,986	55,710	66,370
Machine Tool Index	67.1	60.3	46.8
Finished Steel Shipments (tons)	598,915	591,728	745,063
Ingot output (daily average, tons)	96,372	100,243	124,174
Dodge Bldg. awards in 37 states (sq. ft.)	.....	19,981,100	14,664,400
Automobile output	*440,000	501,837	350,616
Coal output (tons)	26,790,000	21,920,000	28,100,000
Business failures; number	1,027	1,115	977
Business failures; liabilities	$15,669,627	$18,063,823	$22,560,835
Cement production (bbls.)	.....	6,136,000	8,554,000
Cotton consumption (bales)	.....	462,844	519,765
Car loadings (weekly av.)	578,055	575,776	604,039

*Estimate.

Foreign Trade

	May, 1935	April, 1935	May, 1934
Exports	.....	$164,350,000	$160,207,000
Imports	.....	$170,567,000	$154,647,000
Gold exports	.....	$62,000	$1,780,000
Gold imports	.....	$148,670,000	$35,362

Financial Indicators

	May, 1935	April, 1935	May, 1934
25 Industrial stocks	$155.20	$149.73	$131.17
25 Rail stocks	$24.18	$24.01	$34.15
40 Bonds	$80.77	$80.63	$82.24
Bank clearings (000 omitted)	$20,740,277	$20,892,889	$17,952,982
Commercial paper rate, New York (per cent)	1	1	1
*Commercial loans (000 omitted)	$7,612,000	$7,830,000	$8,026,000
Federal Reserve ratio (per cent)	73.3	76.9	69.0
†Railroad earnings	$34,625,786	$37,850,965	$32,264,611
Stock sales, New York stock exchange	30,438,423	22,408,195	25,343,000
Bond sales, par value	$285,404,900	$267,544,100	$284,742,800

*Leading member banks Federal Reserve System.
†April, March and April, respectively.

Commodity Prices

	May, 1935	April, 1935	May, 1934	Monthly av. 1913
STEEL's composite average of 25 iron and steel prices	$32.35	$32.29	$32.97	$26.32
Bradstreet's index	9.90	$9.79	$9.14	$9.21
Wheat, cash (bushel)	$1.06	$1.13	$1.07	92c
Corn, cash (bushel)	$1.04	$1.04	66c	51c
Petroleum, crude (bbl.)	98c	98c	98c	$2.50

Fig. 1—This high-carbon, high-chromium steel die was hardened by the pack method. Because of uncontrollable variables in the process, it was pitted and burned

HARDENING TOOL STEELS IN CONTROLLED ATMOSPHERES

BY S. K. OLIVER
Delco Products Division, General Motors Corp.

IN BEGINNING an investigation of furnace atmospheres for hardening tool steels, the author assumed that the troubles in his plant could be solved by using the same atmosphere in hardening high speed steel, for instance, as Sam Tour used in the state of New York. Mr. Tour claimed that with a preheating atmosphere of 3.0 per cent O_2 and 11.8 per cent CO_2, along with a hardening atmosphere of 8.2 per cent CO_2 and 5.1 per cent CO, grain growth could be inhibited and pieces could be hardened without scale or soft skin.

Using this atmosphere in equipment identical to that used by Mr. Tour, it was found that the finished hardened pieces sloughed off to the extent of 0.005-inch per 10 minutes in the hardening heat. As far as grain growth is concerned, in all experiments with atmospheres, no correlation was found between grain growth and atmospheres.

It was decided to come closer to home—Cleveland—which is approximately 225 miles from Dayton. It had been observed that several plants in Cleveland were hardening high speed steel without any apparent sloughing off of the metal, or decarburization of the surfaces of the steel. These plants were using a preheat atmosphere of 1.0 per cent CO-7.0 per cent CO_2 along with a hardening atmosphere of 8.0 CO and 5.0 per cent CO_2. Setting our equipment to duplicate these atmospheres, we proceeded to harden test pieces. These pieces after hardening lost 0.002-inch per 10 minutes at hardening heat and also developed a soft skin of approximately 0.003-inch thick. This experiment proved to be the climax, for from that time on, we have stayed at home.

The question immediately arises—why will atmospheres work in one locality and yet fail in other localities as far as protection of steel at the hardening heat is concerned? Perhaps reference to the accompanying table may suggest a solution to this problem. These preheating and hardening atmospheres used by Tour and the Cleveland plants would be considered

THE accompanying article constitutes a paper presented at the Tri-Chapter meeting of the Dayton, Columbus and Cincinnati chapters of the American Society for Metals held in Dayton, O., April 15. The author, S. K. Oliver, is metallurgist, Delco Products division, General Motors Corp., Dayton, O.

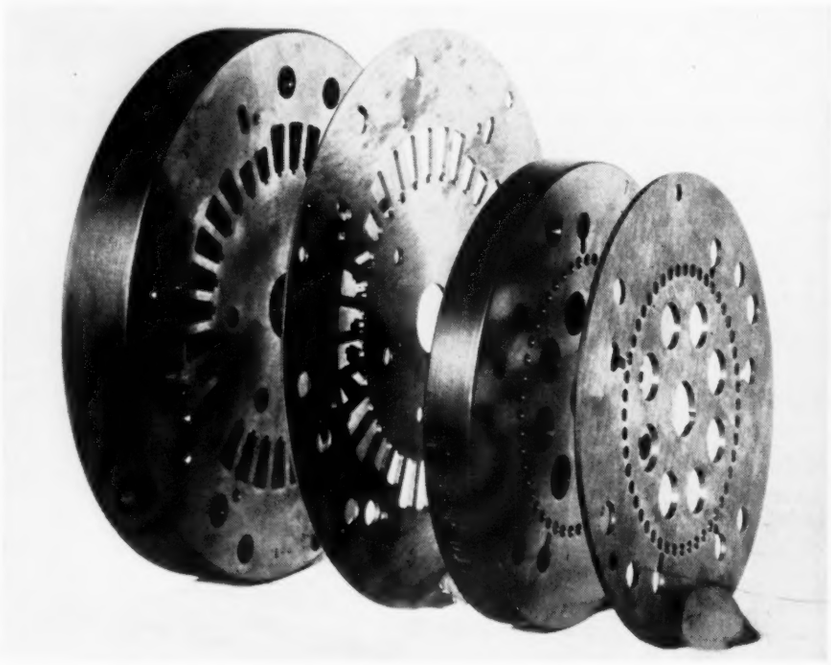


Fig. 2—This group of high-carbon, high-chromium steel dies for punching silicon sheet lamination blanks was hardened in controlled atmospheres. The thick dies are as hardened; the thin ones have been used and worn out in production

oxidizing by the ratio theory advanced by Jominy, Wood, Stansel, and others. Regardless of this theory, however, each atmosphere was satisfactory in its own locality—why?

All three atmospheres will contain a great deal of moisture because of their high H_2 content. E. R. Mort claims that the atmosphere must be very dry, while Marshall says that a certain percentage of moisture is absolutely necessary. Why go on? Why become involved deeper in an endless amount of facts which contradict each other?

The discussion will now center around steel, ranging from 0.70 to 1.30 per cent carbon, which includes what is generally known as water and oil hardening tool steels having a hardening range from 1420 to 1550 degrees Fahr. Fig. 4 indicates what can be expected in the way of atmospheres for hardening tool steels in different types of furnaces.

Only Slight Scale

With the box-type electric furnace (atmosphere controlled by the burner under the hearth) the best results obtained to date have been with a hardening atmosphere of 4.0 per cent CO_2 and 6.0 per cent O_2. A small amount of scale, approximately 0.0003-inch thick per 1 hour at hardening heat, is the only objectionable feature, but this scale frees itself immediately in a water or oil quenching leaving the pieces with a smooth, hard finish. A higher percentage of O_2 causes excessive scaling while a higher CO_2 constituent in the atmosphere causes the dreaded phenomena—soft skin. Also observe in Fig 4 what an atmosphere on the reducing side will do to carbon tool steels. In this particular case, a total decarburization was found to be 0.009-inch in depth per 1 hour at the hardening heat.

The box-type gas furnace probably is the most widely used equipment in the present-day tool hardening department; but how much thought is given to controlling the atmosphere inside the furnace? Of course, it is a difficult job, because it is necessary to maintain the temperature of the furnace with the same burner that determines the atmosphere. In spite of this, however, many tool hardening departments can improve their tool hardening appreciably if advantage is taken of the small amount of atmosphere control to be had with this equipment.

Referring again to Fig. 4, that portion of the graph designated by the box-type gas furnace indicates the difference in the quantities of O_2 and CO_2 that are necessary to obtain similar results to that given by the box-type electric furnace. The best results the author has witnessed in this type of equipment were with a 5.0 per cent CO_2 and 4.4 per cent O_2 atmosphere. A slight scaling—0.0004 to 0.0005-inch per hour in hardening heat—will take place.

In the lower curve of Fig. 4, marked by the word "reducing," a graphic picture is shown of what happens to tool steels hardened in an atmosphere of 4.6 per cent CO_2 and 10.6 per cent CO. A slight amount of scaling always takes place and is followed by decarburization of from 0.004 to 0.005-inch on the surface of the pieces per hour at hardening heat.

In the retort type of equipment, where the atmosphere is supplied by reforming air and gas in a separate unit, tool steels can be hardened without scale and with a very small amount of decarburization. In the many experiments carried on with this type of equipment, the author has not found an atmosphere which would harden the tools steels of the types now being discussed without scale or decarburization. The nearest approach to a hardened piece free from scale and decarburization was with an atmosphere containing 7.7 per cent CO_2 and 1.1 CO. These pieces had a soft skin of approximately 0.004-inch per hour at the hardening heat.

Difficult To Judge Surface

Many times, hardened pieces have a nice but deceiving appearance; good appearance is not the answer for good tools in all cases. As illustrated in Fig. 3, the tool at the left has been hardened in a box-type gas furnace using a hardening atmosphere of 4.0 per cent CO_2 and 6.5 per cent O_2. The thickness of the scale formed was 0.005-inch. The next piece, in the center, although it shows no scale whatsoever, has a soft skin 0.010-inch thick. If the usefulness of these pieces were to be judged by their appearance, the middle piece probably would be selected instead of the one with the scaly surface. It so happens that the scaly tool is of greater value

Furnace Atmospheres Used in Various Localities

	Preheat 1600 Deg. Fahr. Per Cent			Hardening Heat 2300-2350 Deg. Fahr. Per Cent			Gas Supplied at Burner Per cent		Remarks
	O_2	CO_2	CO	O_2	CO_2	CO			
Sam Tour, New York	3.0	11.8	0.0	0.0	8.2	5.1	H_2	36.0	Surface O. K.
							CO	17.4	
							CO_2	3.4	
							O_2	0.3	Grain size fine
							N_2	12.0	
							C_2H_4	24.9	
							Illum.	5.2	
Cleveland	0.0	7.0	1.0	0.0	5.0	8.0	C_2H_4	69.4	Surface O. K.
							C_2H_6	15.8	
							N_2	0.8	
Dayton, O.	0.0	2.5	12.5	0.0	3.4	9.2	C_2H_4	72.0	Surface O. K.
							C_2H_6	5.0	
							CO_2	1.0	
							N_2	0.8	

FIG. 3 — Hardened tool steels sometimes have a deceiving appearance. The piece at the left is scaled to a depth of 0.005-inch but is usable; piece in the center has no scale but has a soft skin 0.010-inch thick, making it unusable; and piece at the right has an unobjectionable light scale and a hard, smooth surface free from decarburization

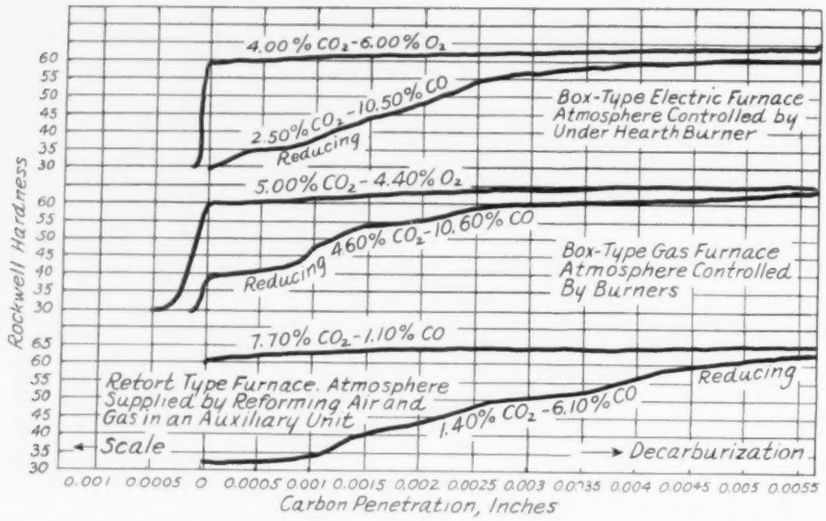


Fig. 4—This chart shows the effect of atmosphere in hardening 1.10 per cent carbon tool steel in different types of furnaces. All samples were heated to 1440 degrees Fahr. and quenched in water

than the clean surfaced tool because of the undesirable amount of decarburization of the latter.

The tool on the right, Fig. 3, was hardened in a box-type electric furnace in an atmosphere of 4.0 per cent CO_2 and 6.0 per cent O_2. Upon close investigation, very fine particles of scale were to be seen, 0.0004-inch thick, but not objectionable in the least. Otherwise, the surface is hard, smooth and free from decarburization and is the type of tool that toolmakers like to receive from hardening.

Let us now turn to that group of steels which is generally known as the high-carbon, high-chromium series. These steels have a hardening range anywhere from 1650 to 1825 degrees Fahr. and are supplied in either air or oil hardening types.

Best Atmosphere Determined

The atmosphere in box-type gas furnaces does not lend itself readily to this steel. The author has found an atmosphere containing approximately 9.4 per cent CO_2 gives the best results. A scale of 0.0005-inch per hour at the hardening heat usually results from an atmosphere of this type. When O_2 appear in the analysis, considerable scaling takes place, and when lower CO_2 is used, soft skin develops in this equipment. High-carbon, high-chromium steel can be hardened without scale formation and decarburization in the box-type electric furnace, using an atmosphere of 2.5 per cent CO_2 and 12.5 per cent CO.

The same results can be arrived at in a retort-type furnace by using raw gas. The raw gas cracks down in the retort to approximately 12.0 per cent CO. Hardening high-carbon, high-chromium steels in either the box-type electric or retort furnace with a controlled atmosphere is far better than the old pack method, which, by the way, is not so old, because approximately 90 per cent of all high-carbon, high-chromium steel made into dies is hardened by this method.

In Fig. 1, we have a piece that was hardened by the pack method. Of course, packers have their problems too—dirty charcoal, inability to know the temperature of the work inside the box, and many other detailed faults are some of the reasons why a die comes out of the hardening heat pitted and burned, as shown in this illustration. In Fig 2, on the other hand, we have a group of dies hardened in controlled atmospheres. The thick dies are as they come from the hardening department; while the thin dies are as they are removed from service in the manufacturing division. In other words, the thin dies have run approximately 2½ million silicon sheet lamination blanks and have been ground down to such a thickness as to be of no further use in production.

At this point, it is desirable to touch briefly upon the other type of atmosphere producing equipment used in heat treating departments today; the cracking of a blended oil in an auxiliary furnace and allowing the gases to pass through the hardening furnace is one of the popular types. The atmosphere produced by this method usually is high in CO content and low in H_2 content. The CO usually analyzes 26.0 to 28.0 per cent, while the H_2 is around 10.0 to 12.0 per cent. An atmosphere of this type will satisfactorily protect work to be hardened from being scaled or decarburized, but the writer has found that traces of CO_2 as low as 0.2 per cent by volume will cause a soft skin condition penetrative to great depths.

Presents Control Problem

Although the cracking of blended oil solves the locality problem of atmosphere, in itself it presents a very dangerous problem as to its control. It has been witnessed that pieces of a 0.15 per cent vanadium type water hardening tool steel hardened in an atmosphere derived by cracking a blended oil have resulted in decarburization to a depth of 1/16-inch because of the very small amount of CO_2 present.

Although we have a problem that solves a problem, we are no closer to a solution of atmospheres and we still have not solved the locality complex of atmospheres with which we started out. So far, we have discussed: (1) Atmospheres used with high speed steels; (2) atmospheres used with water and oil hardening types of tool steel; (3) atmospheres used with high-carbon, high-chromium steel; and (4) atmospheres produced by cracking blended oil.

The writer has found by experience that with use of 950 to 1100 B.t.u. gas, the same as is available in Dayton, it is possible to produce the same results

(*Please turn to Page* 48)

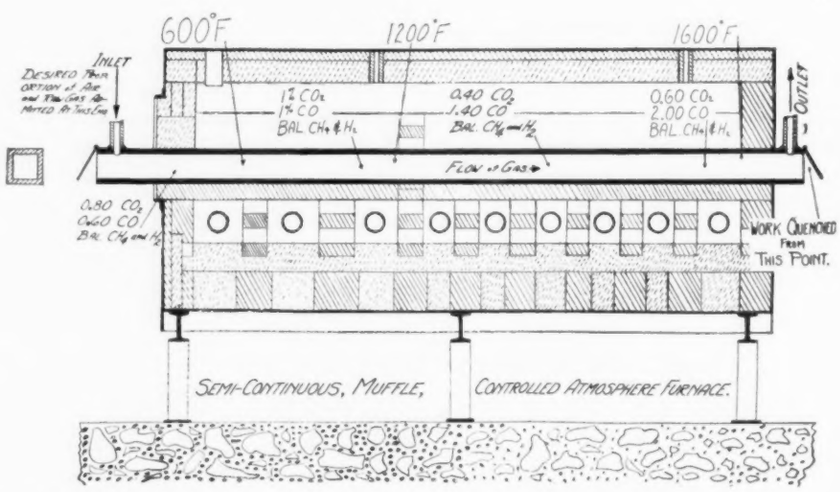


Fig. 5—Proposed design for a controlled atmosphere furnace to harden all classes of tool steels in any locality without scale or surface decarburization. Three zones are established and the proper atmospheres to be maintained in these zones are indicated

Improved Properties Extend Uses for Malleable Iron

BY D. P. FORBES
Gunite Foundries Corp.

THE accompanying article constitutes a paper presented in Chicago, March 18, at a meeting on "Engineering Uses of Modern Cast Metals," sponsored jointly by the Chicago section of the American Foundrymen's association, Western Society of Engineers and the Chicago section of the American Society of Mechanical Engineers. The author, D. P. Forbes, is president, Gunite Foundries Corp., Rockford, Ill.

MALLEABLE iron must be regarded as a working material; in other words, it is more usually a component of machines than it is of static structures. It has to have strength to withstand strains, and toughness to withstand abuse.

College textbooks on metallurgy usually mention malleable iron in a vague sort of way as illustrative of the reactions of the decomposition of iron carbide by heat treatment. Photomicrographs show the formation of temper carbon. Little, if any, emphasis is laid upon the merits of the material so obtained. Textbooks on mechanical engineering mention malleable iron as one of the materials of construction and occasionally give some of the physical properties, along with those of cast iron, wrought iron, steel, and other material. In general, handbooks which are used in drafting rooms and engineering offices give physical properties for malleable iron of the vintage before the war. As a result, malleable sometimes is overlooked for applications in which it is the most logical material.

Erroneous Impressions

In contacts with many well-informed engineers, the author has found numerous misconceptions concerning malleable iron of which the following are the most prevalent: That malleable iron is gray iron which has been annealed to bend; that the strength of malleable iron lies in the skin and if this skin is removed the casting becomes very weak; that malleable iron of more than ½-inch section cannot be annealed; and that if malleable iron is galvanized, it loses its strength.

It might be well to discuss briefly how malleable iron is made. The usual commercial analysis has a carbon content slightly under 2.50 per cent and a silicon content slightly under 1.00 per cent, with other impurities such as manganese, sulphur and phosphorus, within certain definite limitations. This material is poured into sand molds and solidifies as white cast iron castings. White iron is very hard and brittle and finds some commercial application in wearing parts, such as sand blast nozzles, cleaning stars and ball mill balls. White iron castings which are to be malleablized are heat treated or annealed in large ovens, usually being packed in containers with a sand or slag packing material, the principal purpose of which is to prevent warping of the castings. In the old days, an oxidizing packing was used, which was intended to reduce the carbon content of the castings, but this practice has been almost completely abandoned.

Heat treatment consists of holding the castings at a temperature of 1600 degrees Fahr. or more for a sufficiently long period to break down the iron carbide into two constituents—temper carbon nodules and a solid solution of iron carbide in iron. The castings then are cooled in such a way that the carbide is precipitated out of the solid solution as additional temper carbon, leaving an ultimate structure of soft iron and uniformly distributed nodules of temper carbon.

Annealing Time Reduced

As the metallurgy of this reaction has become more widely known, malleable foundries have taken advantage of the most desirable heat treating temperatures and as a result have succeeded in materially shortening the time required for annealing, which averaged, roughly, seven days. A considerable tonnage of malleable iron now is made with a total time in the oven of three days, and this malleable iron is of the highest quality. The shortened anneal is possibly only if extremely accurate temperature control can be maintained, and this is extremely difficult in large ovens, or with antiquated equipment.

Let us consider what the castings are like when they reach the purchaser's hands. The metal will have a tensile strength ranging from 50,000 pounds per square inch for high carbon iron to 60,000 pounds for low carbon iron, the increased strength being due apparently to the smaller percentage of temper carbon nodules which contribute nothing to the tensile properties. It is surprising that malleable iron test bars with a rough sand cast surface on the outside will show unusual uniformity. The maximum variation from a 55,000 pound per square inch tensile strength average is rarely more than ∓ 3000 or 4000 pounds per square inch. This means that malleable iron is uniform and dependable.

Malleable iron is unusual in that the yield point is a very high percentage of the ultimate strength. For example, a malleable with 55,000 pounds per square inch ultimate strength will have a yield point of about 37,000 pounds per square inch, or 67 per cent—a high yield point and good ductility.

Most malleable produced is tough and ductile. The elongation of a ⅝-inch diameter test bar in a 2-inch gage length is above 15 per cent. Producers of low-carbon malleable have no difficulty in averaging as high as 25 per cent. From this it can be seen that malleable with a high yield point and a good ductility is at least comparable from a strength standpoint with low-carbon cast steel and soft forgings.

Determining Usefulness

Malleable iron has a number of fields of usefulness, in which it is firmly entrenched. In the long run, a product will be purchased only if it fills the necessary requirements at the lowest cost. It is useless for an industry to try to sell a product for an application where some other material is more economical.

This can be illustrated by the use of malleable iron in the automotive industry. As an example, take the front hub of a passenger car which is almost universally produced of malleable iron. It could be made as an upset forging or as a steel casting, or an assembly of two rather simple stampings, and these other materials have been used. What property of malleable iron makes it particularly suited for such an application?

In the first place, the yield point of malleable is sufficiently close to that of forgings, steel castings, and stampings, so that from a static strength standpoint the other materials offer no particular advantages. The ductility of malleable, being over 15 per cent, is adequate in most cases, to provide sufficient toughness to withstand blows and road shocks without sudden failure.

From a cost standpoint, the malleable casting probably is slightly cheaper than the steel casting and

the forging. From the standpoint of adaptability to design, malleable iron probably is somewhat more flexible than the other materials. The stamping would have the disadvantage of requiring assembly and also would necessitate uniform sections at all points. The big saving to the manufacturer, however, is in the cost of machining. Malleable iron can be machined at higher rates of speed than any other ferrous metal, with the possible exception of fully annealed cast iron. There is a saving not only in the cost of machining each individual hub but also fewer machine tools are required to attain a definite production. As a result, a malleable iron hub is the least expensive hub which will fill the engineering requirements of such a part.

Other applications of malleable on automotive vehicles are pedals, spring brackets, differential carriers and cases, various brake parts, and numerous brackets, levers, and supports throughout the chassis and motor. Automotive engineers are thoroughly conversant with the properties, limitations, and design of malleable castings, and the use of malleable on automobiles has expanded steadily in the past few years, in spite of inroads from stampings, forgings, and die castings, where such materials are better suited.

Malleable iron finds many uses in the railroad field. Here, the machinability of malleable iron is of practically no consequence. What is wanted is a low-cost, strong, tough material. For many light parts, of which box car door fittings are typical, production quantities are usually so small that forgings are at a cost disadvantage because of cost of dies, and steel castings are at a cost disadvantage because of difficulty of casting light sections. Malleable is suited ideally for this purpose. For heavier castings, such as running gear parts, malleable is in most cases an optional material with cast steel and whichever material has the lowest market price at the time usually is selected for the parts. Uses for malleable castings in the railroad field include side bearings, journal boxes, center plates, brake heads, column guides, brake beam brackets, draft gear parts, draft lugs, and coupler carriers.

Resists Corrosion

Malleable iron is used extensively in railroad work because of its excellent corrosion resistance. In this respect, it appears to be decidedly better than stampings or forgings and under certain conditions it is superior to steel castings. This is due to the graphite content in the malleable iron which tends to inhibit the penetration of rust.

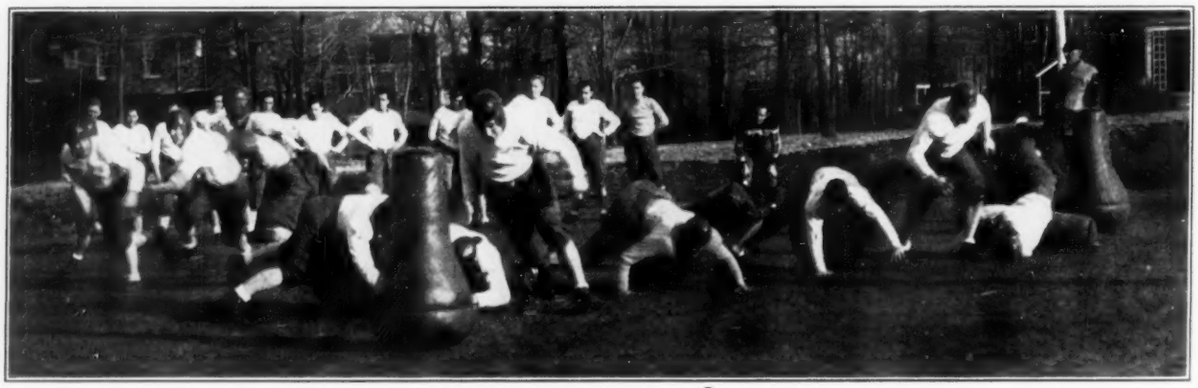
In the agricultural field, malleable iron is used extensively for the reason that agricultural implements are badly abused. Most operating parts are not machined and smooth surfaces are necessary. The metal must be tough to withstand shocks encountered in service and the metal must be rust resisting to withstand the exposure to which nearly all agricultural implements are subjected. Agricultural machinery companies have literally thousands of patterns and while many parts are now made of forgings, the investment in dies would be prohibitive from the manufacturer's standpoint if all parts were to be forgings.

Of more interest in many cases are the miscellaneous applications, such for example, as lawn mower gears, washing machine parts, hardware items, conveyor chains, tool parts, pipe fittings, bolt anchors for cement construction, railing panels for bridges, industrial fence fittings, manhole covers, small machine tool parts, barrel plugs, electrical outlet boxes, cable clamps, insulator supports, school desk frames, packing house machinery, sewing machine parts, and literally thousands of other applications too numerous to mention.

In many of the above applications the sole reason for the use of malleable iron is that it is not easily broken when subjected to an unusual strain. In many instances cast iron would be adequate from a strength standpoint but this material might snap off if abused from some outside source.

In the past 50 years before laboratories were common and before the metallurgy of graphitization was widely understood, a large amount of inferior malleable iron was produced. This definitely hurt the industry. Just as the steel casting, if improperly made, may contain defects, and the forging may contain cold shuts or burned metal, so

Gridiron Robots Always Up



DUMMIES CAN TAKE IT: Charging against a ton or more of cast iron and cold-rolled steel, well encased in canvas and felt, these Connecticut State college footballers bowl over the dummies, but the design and distribution of weight in the units again proves the hackneyed observation, a man may be down but never out. With cast iron in the base, the dummy comes back like a reception room smoking stand. They are produced in two sizes, one scaling 335 pounds with a cast iron base weighing 250 pounds, the other 230 pounds with a base weighing 175 pounds. The larger is 44 inches high and the smaller 42 inches, the diameters of the base being 26 and 22 inches respectively and the top 20 and 16 inches. The cast iron base is protected by cushioned felt and canvas. The upper section is removable and comprises a set of disks, bolted together with cold-rolled steel rods 36 inches long, $\frac{7}{8}$ and $\frac{3}{4}$-inch diameter, depending on the model. The unit is covered with heavy white canvas and is constructed with a mushroom ridge at the top, making the dummy more "human" for the shoulder block, also aiding in the return action. The dummies, known as Comebacks, are easy to handle when rolled as a barrel, and may be arranged in any combination of positions, on the line or backfield defense. Endorsed by many leading football coaches, they are manufactured by the Marty Gilman Sporting Goods Co., Gilman, Conn., from a design of Martin J. Gilman, former grid star

also may the malleable casting contain shrinks and primary graphite.

If the white iron of which malleable is made contains any graphite before anneal, it will be weak and poorly ductile after the anneal, particularly in the heavy sections. Many tons of such iron have been shipped to customers in the past and resulted in malleable iron receiving a black eye, particularly in heavy castings. It has been a difficult process of education to convince purchasers that the remedy has been found, and that malleable iron is entirely reliable in castings of moderately heavy sections, if of the correct analysis.

Foundry technique also has advanced greatly in the elimination of shrinks and porous sections in the castings. In the old days, it was the custom to eliminate shrinks in vital places by the use of chills, which served to drive the shrink to a less important spot in the casting. This practice has been changed radically over the last ten years, so that now shrinks are eliminated by suitably situated feeder heads, which supply molten metal to the casting as it solidifies. The proper location of gates and feeders is a science in itself and malleable foundry foremen have become very proficient in gating castings correctly. It is relatively simple for a foundryman to break up white iron castings, due to their brittleness, and inspect each sample for defects before the patterns are started in production in the foundry.

Standards Raised Steadily

Improvement made in the elimination of shrinks and primary graphite has been of as much benefit in expanding the market for malleable as a steady improvement in tensile strength and elongation, which has resulted from submission of test bars to a central laboratory for certification. It is interesting to note in this connection that the malleable industry over at least the last 20-year period has constantly asked the American Society for Testing Materials for an increase in the standard physical specifications.

Advancements in metallurgy have disclosed that the same process which forms malleable iron will form other valuable products if the method of manufacture is varied. One hundred years ago wrought iron was used universally for structures requiring high strength, because steel was not commercially available. Steel contains appreciable percentages of combined carbon, where wrought iron does not, and, therefore, is much stronger. In a similar way, products have appeared which are similar to malleable iron, except that they contain up to 0.80 per cent of combined carbon; malleable iron contains practically none. The utility of these products is great since care in manufacture will develop high tensile strength with reasonable ductility.

A typical example of such a material would have a tensile strength of 90,000 pounds per square inch, a yield point of 70,000 pounds and elongation of 16 per cent in 2 inches. Another type might have a tensile strength of 70,000 pounds per square inch, a yield point of 50,000 pounds and an elongation of 16 per cent. The field of usefulness for such metals has not yet been adequately explored, but it is probable they will invade the present field of forgings, steel castings, and malleable iron. The handicap at the present time is the necessity for expensive equipment for the accurate heat treatment required to obtain uniformity.

These metals cannot be classed properly as malleable iron and as yet no standard has been set up by any of the engineering societies covering physical properties, although steps already have been taken not only to find a name which covers the various materials in this group but also to investigate the practicability of tentative specifications for such products.

Molybdenum Exerts Three Principal Effects in Corrosion Resisting Steels

BY C. M. LOEB JR.
Climax Molybdenum Co., New York

MOLYBDENUM'S place in corrosion resisting alloys differs for various alloys. Its most important functions fall into three groups.

The first of these is its function of effecting control of structure, such as in 18-8, chromium-nickel, stainless steel. The most important effect of adding molybdenum to stainless steel of the 18-8 or higher chromium-nickel varieties is its effect of retaining the proper structure for maximum corrosion resistance. Without a molybdenum content, the carbon, even if quite low, has a tendency to segregate at the grain boundaries, especially at elevated temperatures. This results in either a pitting action or an intergranular attack which has the effect of "rotting" the material.

Thus, molybdenum permits the use of a higher carbon stainless steel without a tendency toward carbide segregation. In addition, when high carbon is used, especially for castings which it is difficult to produce under 0.10 per cent carbon, the carbide precipitation which does occur in the presence of molybdenum is usually evenly distributed within the grains, rather than at the grain boundaries.

The prevention or slowing down of carbide precipitation at elevated temperatures makes the molybdenum containing steels more successfully weldable, since the carbide precipitation around the weld, which normally results in reduced corrosion resistance, is minimized. Naturally, if it is possible to heat treat the piece after welding, molybdenum is not necessary.

The proved effects of molybdenum additions in such stainless steels already have resulted in making the specification of molybdenum practically standard practice in the paper mill industry in which sulphide liquors are encountered, in the textile and dye industries and for resistance to the attack of phosphorus base acids.

Combats Corrosive Attacks

The second important function of molybdenum is as a fundamental corrosion resisting factor.

Molybdenum additions in amounts of 3 to 20 per cent may be found in various iron-chromium, iron-nickel-chromium or iron-nickel alloys. The addition is known greatly to improve their resistance to exceptionally corrosive combinations of acids, or bases, or salts and especially to chlorine (either fixed or free) containing solutions. Its function in these alloys is not completely understood. Nevertheless, it is known that the metal itself is very resistant to this type of corrosive attack, and the alloys containing molybdenum undoubtedly assume some properties of the pure metal.

In its third important function molybdenum serves as an "intensifier." Molybdenum additions serve to intensify the effects of other alloying elements in iron or steel. This is reflected both in physical properties of engineering steels and in the field of corrosion resistance. An example is found in a well known iron which is an alloy of pure iron with 0.40 to 0.50 per cent copper and more than 0.06 per cent molybdenum. Without the molybdenum addition only about 0.25 per cent copper may be added usefully for general corrosion resistance, whereas in the presence of molybdenum this copper content may be raised to 0.50 per cent.

To Buy or Not To Buy?

HOWARD W. DUNBAR,

General Manager, Grinding Machine Division,
Norton Co., Worcester, Mass.,

SAYS:

NEVER before, in my opinion, has it been possible to invest money in new machine tools with greater safety and assurance of high returns than at the present time.

This is true regardless of whether business continues to improve or whether it again drops off. It is doubly true if the future holds any tendencies toward inflation, since under such conditions possession of modern equipment will prove infinitely more valuable to the manufacturer than the amount of money required to buy it.

The reason is that the new machines permit lowered costs and improved quality in a measure which cannot be ignored by manufacturers whose operations involve volume production. The great reduction in tolerances which has brought about the recent improvements in automobiles and many other products has been made possible by the new machine tools. New standards of accuracy have been set, with accompanying lower costs.

Savings Average 25 Per Cent

The savings result from increased production, the lower cost of inspecting work produced on today's machines, the lower costs of assembling accurately machined pieces and other factors. Such savings obtained with our grinding machines of latest design represent an improvement, on the average, of about 25 per cent, compared with the performance obtained from machines built five to ten years ago. Many of the new machines we are selling will pay for themselves within a year.

The principal reason for the great improvement in performance is that the machine tool industry now is thinking within limits of 0.0001-inch, whereas it formerly thought in terms of 0.001-inch. In grinding machines this change is particularly significant in view of the fact the grinding machine is the only machine tool which is required to reproduce in the work the accuracy that is built into the tool itself.

New Low on Tolerances

We now are able to guarantee that our cylindrical grinding machines, for instance, will repeat in production within 0.0003-inch, a guarantee which would have been impossible two years ago. This control of accuracy is made possible by improved quality and a positive sizing device. The possible accuracy is only that built into the machine itself. This accuracy is reflected in such parts as the work spindle on these machines. This spindle is machined in 20 operations, each of which must be within 0.0001-inch of perfect accuracy to pass inspection. As a result, mirror finishes are being obtained today where dull surfaces were obtained a few years ago.

Users find in the new machines a flexibility and interchangeability of design never before available. This advantage, for example, is incorporated in our line of cylindrical grinding machines. These machines have a hand

" . . . . Flexibility of design is one of the spectacular results of the efforts of the machine tool industry during the depression," observes Mr. Dunbar in this discussion of the many cost-saving features of modern tools, with special reference to grinding machines. This is the fourth in a series of opinions voiced by leading personalities in the machine tool industry—part of a planned effort by the editors of STEEL to center attention upon the advantages of capital goods replacement.

grinding wheel feed which indexes to 0.0001-inch; for fast traverse of the wheel head either mechanical or hydraulic power wheel head mechanisms are available as desired. Three arrangements of table traverse are available—hand, hydraulic power and mechanical power.

Many different combinations are available with these machines, set up, for example, for semiautomatic operation. They can be built with hand or hydraulic table traverse, live spindle or dead center headstock, hand or hydraulically operated footstock, with automatic mechanical or electric sizing. Practically any external cylindrical grinding job can be performed by the use of made-to-order fixtures which replace the regular work supporting units. Steadyrests can be hand or hydraulically and automatically operated.

Speeds, Feeds Synchronized

In these machines the wheel is moved rapidly toward the work, which automatically starts the rotation of the work. At a point predetermined for each job the wheel feed is throttled down automatically to a grinding feed. Several different rates of feed in one cycle can be provided if desired, the change from one to another occurring automatically.

In one of these machines, engaged in grinding grooves in transmission gears, for instance, there is a fast feed up to the work, followed by a slower feed as the wheel grinds down the sides of the groove and finally a still slower feed for grinding the diameter at the bottom of the groove; when the correct diameter is produced, the wheel feed is reversed automatically and the work rotation stops.

Built To Be Interchangeable

However these machines are set up, and whether they are to be automatic, semiautomatic or hand operated, they all start out with the same base line assembly. This consists of the base, a sliding swivel and table that carries the work, a wheel slide with wheel head and a wheel slide feeding mechanism with necessary guard. To the base line assembly, mechanisms are added in accordance with the customer's requirements.

For the first time, because of this interchangeability, we are able to convert a machine at a customer's plant, if desired, from one type to another. That is, when a machine has been discharged from one production job, it may be fitted for another. All that is necessary is that it be dismantled down to the base line and equipped, at relatively small cost, with the mechanism desired for the new job.

This flexibility of design is one of the spectacular results of the efforts of the machine tool industry during the depression to achieve more efficient designs which might be built more economically, so as to sell at minimum prices, and which at the same time would turn out more and better work.

METHODS AND MATERIALS

Tool Builder Cuts Cost of Patterns

A PRONOUNCED saving in the cost of making patterns for machine tool frames and beds has been effected by a New England manufacturer as a result of its experience with welded rolled steel.

When this company, several years ago, made an experimental machine out of welded rolled steel, it developed production designs suitable for the welded construction. Later, under the NRA codes, the cost of welded steel construction advanced to such a level as to make it advisable to continue with castings which had remained at substantially the former prices.

The company did not make the castings from patterns made by the old methods, however. Instead, it reproduced in 25 per cent heavier section the welded steel structures as castings. Inasmuch as the welded steel structures involved flat surfaces mostly, without the rounded corners which have been characteristic of castings since time immemorial, the job of making the wood patterns from the welded steel design was a simple and inexpensive one.

As a result, the company is in a position to furnish machine tools which are identical in appearance whether they are built up of castings or of welded rolled steel sections.

As a companion to streamlining, the angular modern design is as definitely suitable for a machine tool as a skyscraper. The impression to be conveyed in both cases is solidity as well as beauty. Furthermore, streamlining is carried out very thoroughly in new developments in tools, for it is found that toolholders without projecting locating and adjusting screws do not catch chips.

For Cleanliness and Comfort

PRESSED STEEL WASHFOUNTAINS: With enameled pressed steel sinks now an established commercial product, it was only a short step to the fabrication of enameled pressed steel washfountains for industrial use. Bradley Washfountain Co., Milwaukee, has introduced a new line of this equipment, circular in design, the 54-inch diameter making room for ten men at one time. Bowls are solid one-piece stampings of 10-gage deep drawing stock, furnished by the American Rolling Mill Co., Middletown, O., reinforced with an angular disk and finished in acid-resisting vitreous enamel. Ether a roll rim or deep apron design is available, with either hand or foot control of water flow. Pedestals are of pressed steel base members with electrically welded cylindrical superstructure finished in either vitreous enamel or high-bake synthetic enamel. Made of pressed steel, the fountains are lighter than conventional types, are free from surface irregularities and are claimed to withstand rough usage

S S S

Purple Thread To Identify Canadian Insulated Wire

A standard identification of insulated wire and cable made by Canadian and United States manufacturers has been adopted by the Canadian Engineering Standards association and the Underwriters' laboratories. Purple thread will be woven into the outer braid of wire made by Canadian manufacturers. The Underwriters' laboratories have promised not to assign any markers containing purple thread to United States manufacturers and to discourage the use of purple thread in any form by United States manufacturers.

S S S

Power Press Die Men Must Take Safety Precautions

Die try-out men of the Murray Corp. of America, Detroit, must practice safety in regard to placing the safety block between press dies before working between them, and their responsibility for practicing safety is the

same as that of operators. So writes R. A. Shaw of the Murray Corp. in the May issue of the *Power Press Safety News Letter* published by the National Safety council, Chicago.

"In April, we saved a hand of a die man, because he placed a piece of 2 x 4 in between the dies while he was working on a spring," states Mr. Shaw. "The top section of the die came loose in such a way that it dropped, crushing the block to a thickness of 1½ inches; but nevertheless, the man's hand was saved.

"The point in question is this: If there isn't room for the regular safety block, the die man must place some suitable material in between the dies in order to be safe in case of an emergency; therefore, the die try-out men must be watched carefully and must follow the rules as religiously as the operators if safety is to prevail."

S S S

Platinum-Rhodium Dies Withstand Molten Glass

A new alloy now is being successfully used as the lining in refractory dies used in feeding molten glass into lamp bases. It has increased the life of these dies by 190 times and production from 7 to 15 per cent.

This alloy contains 90 per cent platinum and 10 per cent rhodium. It is made into linings 0.030-inch thick, which are inserted into Alundum refractory supports, thus making a die with an orifice of 0.756-inch to produce a glass stream ⅛-inch in diameter. The new alloy was developed by Henry K. Richardson and Frank A. Newcombe, Westinghouse Lamp Co., 150 Broadway, New York, winning for them the 1934 award of that company for outstanding accomplishment.

S S S

Signaling System Affords Control of Power Factor

The chief electrician of a large milling company recently rigged up a unique signaling system which makes it possible to keep the plant running at maximum efficiency electrically at all times. A similar system might be applied to metalworking plants.

According to the June issue of *Electrical Production* published by the Electrical League of Cleveland, the system consists of a siren and four lights which are energized by special contacts on the plant's recording wattmeter. The lamps are so arranged that when the loading is so low that the power factor is poor, and operation inefficient, certain of the lamps light up. This is the signal for the foreman to load up as much as possible at that particular time.

When there is a higher range of power consumption, and operation of the plant is efficient, no lights show on the signaling system. When the loading reaches a point where maximum demand limits are approached, the siren sounds, and certain machines must be cut out immediately.

Because loading limitations are less strict at night, special contacts have been put into the circuit and by means of a time switch, these special contacts handle the signaling system. Since the system was installed, maximum demand has never been exceeded.

It would be possible, continues *Electrical Production*, to rig up a completely automatic system to take care of the same conditions, but by means of the signaling system foremen and operators can use their own judgment in the equipment that is to be cut out, allowing a greater flexibility of machine operation.

S S S

Wants Drawing Compound With Easy Cleanability

"We have a problem in the production of shells in our press department," writes a subscriber to STEEL. "We have been unable to find any suitable drawing compound other than mutton tallow which is very messy stuff and difficult to remove.

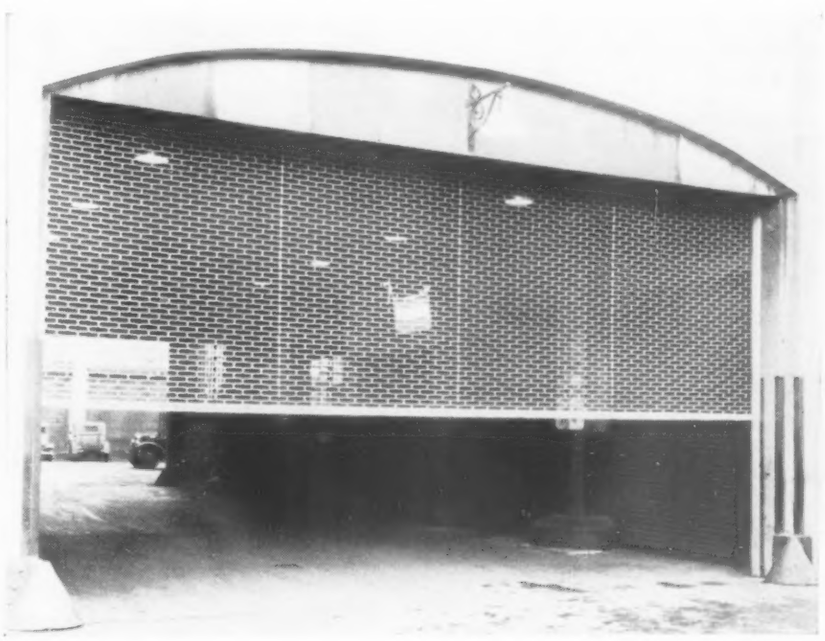
"Please give us a list of firms making drawing compounds that would be economical to use and would simplify the problem of cleaning, for in all the parts we make we finally get into plating operations and, naturally, these parts must be cleaned thoroughly.

"It is necessary that the compound have sufficient body so that the dies will not be scored in the drawing operations."

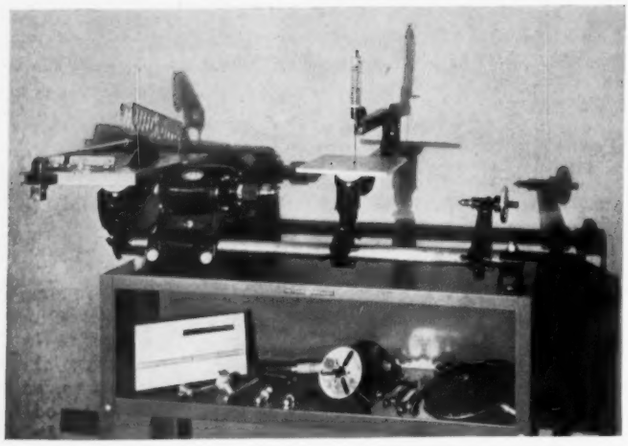
Rolling Steel Grilles for Unusually Wide Driveways

Rolling steel grilles for unusually wide openings now are being produced by Cornell Iron Works Inc., 36-20 Thirteenth street, Long Island City, N. Y. Two such grilles, each 30 feet wide, have been installed by the company for protection of driveways of the Rochester Gas & Electric Co., Rochester, N. Y. A feature of the grilles, as shown in the accompanying illustration, is that they do not obstruct vision. The grilles govern the entry and departure of trucks day and night and each of them is operated about 100 times every 24 hours. Operation is by electric motor and spur gear reduction, with a solenoid brake, magnetic reversing switch, push button controls and emergency hand chain.

The grilles are made of 5/16-inch, galvanized steel rounds, crimped in a special machine and connected with malleable iron links. The weaving is done by hand. Each end of the grille is provided with a continuous line of steel links which are held on the bars by pins. These end links are held in vertical guides so effectively that they will resist a push of more than one ton per vertical foot of the grille without being pushed out of the guides. Weight of these



This rolling grille, made of galvanized steel rounds with malleable connecting links, gives protection without obstructing vision. It withstands a push of more than one ton per foot of vertical height without being dislodged from the side guides



SIX workshop machines have been combined into one compact unit by ingenious use of zinc alloy die castings

grilles is about 2½ pounds per square foot. The grilles are counterbalanced by helical springs in an overhead pipe shaft.

Home Workshop Built Largely of Die Castings

Thirty-two die castings are utilized in a "workshop," a combination of six machines in one, placed on the market some months ago by the General Electric Co., Cleveland. These die castings, made from zinc base alloy, effect economical production of the various parts which include the motor base, saw and sand wheel tables, brackets, calibrated handwheels, and the like.

The equipment, shown in the accompanying illustration, is adaptable to a wide variety of uses in both wood and the softer metals in the home, small shops and schools. By an ingeniously contrived method of mounting, each attachment takes its power direct from the motor for circular sawing, scroll sawing, turning, drilling, sanding, mortising, dowelling, and other operations. One pair of bearings takes care of all operations. Lightness of reciprocating parts has resulted in a design remarkably free from vibration.

When set up, the machine is mounted on a substantial steel cabinet, 1 foot square and slightly over 3 feet long, supported by four steel angle legs attached to the cabinet with bolts. This cabinet provides shelf space for parts not in use. When knocked down, all of the equipment, including the legs, is stored within the cabinet.

Announces Light-Weight Refractory Concrete

A new type of light-weight refractory concrete for casting work on the job has just been announced by Johns-Manville, 22 East Fortieth street, New York. Known as L. W. (or Light-Weight) Firecrete, this new product is composed chiefly of high alumina clay calcined at high temperatures. The resulting concrete weighs only 75 pounds per cubic foot.

Under continuous operation at 2400 degrees Fahr., shrinkage of the concrete is said to be so slight as to be entirely negligible. Furthermore, it has withstood the most severe alternate heating and cooling tests without spalling.

The material is 40 per cent lighter than fire brick and has 40 per cent lower heat storage capacity, according to the manufacturer. This feature is of particular importance on intermittent furnaces which can be brought up to temperature in a much shorter time with less waste of heat each time the furnace cools. Because the thermal conductivity of the new material is considerably less than half that of fire brick, radiation losses are also reduced.

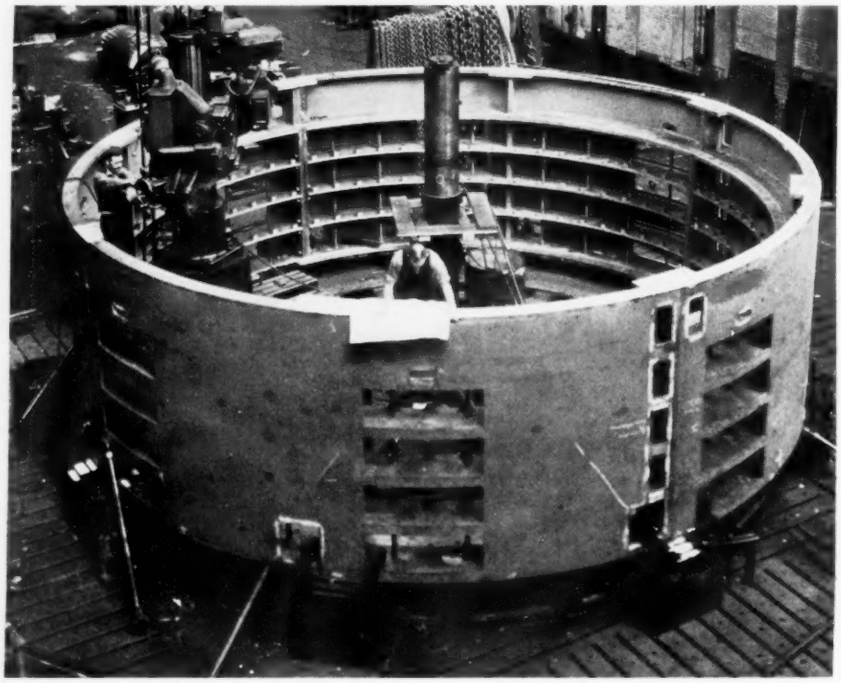
The concrete is particularly recommended for casting light-weight refractory shapes and for furnace doors and floors. It can be put in service after from 12 to 24 hours air curing.

Fatigue Fractures Most Common Cause of Failures

Failures of metal parts in service are more often due to fatigue fractures than to any other cause, so far as the national bureau of standards, Washington, has been able to determine from a large number of tests covering several years.

Comparatively few of the failures were traceable directly to defective material. Usually they originated in

Take Machine to Job



MACHINING STATOR FRAME: Unusual application of fabricating and welding rolled steel sections is involved in assembling a frame for one of the 82,500-kilovolt-ampere waterwheel generator for Boulder dam, work on which is now proceeding in the East Pittsburgh, Pa., shops of Westinghouse Electric & Mfg. Co. Outside diameter of the frame, slightly less than 32 feet, was too large to machine on any of the standard boring mills in the shops. Engineers found it necessary to mount a portable boring mill on a special table inside the frame in order to bore it out and perform other required machining operations. Exact dimensions of the frame are 380 inches outside diameter and 190 inches in height. It is made in four sections, total weight being approximately 144,000 pounds, and total weight of the entire generator slightly over 2,000,000 pounds

a lack of adequate provision to meet service conditions, resulting from incorrect design, corrosive surroundings, or stress-concentration factors.

In explaining these conclusions, W. H. Swanger, chief of the section of mechanical metallurgy, points out they are based on many tests of failed metal parts made at the request of various agencies of the federal government.

50-Ton Box Car 25 Per Cent Lighter

REVISED specifications have been issued by the Mt. Vernon Car Mfg. Co., Mt. Vernon, Ill., covering details of a 50-ton 40-foot 6-inch experimental box car, with steel underframe and steel superframe in which appreciable weight reduction has been effected by use of low-alloy high-tensile steel.

Built along conventional lines of American Railway association 1932 design for box cars, the new unit embodies Cor-Ten steel (United States Steel Corp.) in place of the nearest practical approximate section in strength, high-tensile steel castings for couplers and coupler yokes, Cor-Ten reservoir instead of cast steel for air brakes, Cor-Ten single strength train pipe instead of double strength, high-tensile steel side frames and truck bolsters, light weight brake beams, and cast iron light weight special annealed wheels weighing approximately 665 pounds each.

Weight of the car is 36,400 pounds, compared with an average of 46,500 pounds for all steel box cars built from 1920 to 1934, a saving of 10,100 pounds or nearly 25 per cent.

The greater portion of this reduction is due to the use of low-alloy high-tensile steel. Underframe and superframe are of this material in form of plates, sheets, shapes and bars, 9716 pounds of alloy steel replacing 13,395 pounds of plain steel, a saving of 27.5 per cent on structurals. Further comparable reduction is made on specialties.

In producing this car, all existing A.R.A. detailed standards were observed throughout and all general dimensions of the car were held without change. The various sections were scaled down in thickness and sizes to the approximate equivalent strength to the original details of the car. In some cases it was necessary to substitute pressed shapes for rolled sections.

Complete details of the car are set forth in revised specifications No. 9000 issued by the Mt. Vernon company. The car will be exhibited at the Dearborn street station in Chicago, June 26 and 27, during the A.R.A. mechanical section convention in that city.

WELDING, et cetera . . .

BY ROBERT E. KINKEAD

IN THIS column, the author, well-known consulting engineer in welding, is given wide latitude in presenting his views. They do not necessarily coincide with those of the editors of STEEL.

A Challenge

THE steel industry has a job to do in connection with aircraft. The job is to replace nonferrous metal in the wings and fuselage. This probably means better steel than we have now and it must be of welding quality.

Of course, no one can escape the thrill of riding the big Boeing or Douglass ships through the clouds at night. Nor can anyone fail to have the most profound respect for the engineering talent which produced them. Yet, the fact remains the structural design of the wings and fuselage of these craft is a wretched compromise of first principles of structural design necessitated by the fact the nonferrous alloy used cannot, as yet, be welded safely.

A riveted assembly has the design defect of discontinuity. The final solution of all structural problems is absolute continuity of metal sections, such as obtained in a casting or a welded assembly. And, it is a beautiful demonstration of the complete harmony of nature that absolute continuity of metal sections always gives the best solution from the viewpoint of beauty, utility and economics.

Presently, thousands of tons of metal will be needed for aircraft. It is a challenge to steel and welding.

Junior G-Men

The kids on our street have declared war on crime. They have all had their bicycles stolen once too often. A crook runs a racket in which he pays $3 for any bike—no questions asked. He tears it down, paints the frame and sells it for $10. Now, for 5 cents, the Philo Vance Detective Agency will put a secret mark on the bike of any client. These secret marks are then registered with the local police. An additional fee of 25 cents is to be paid on recovery of the stolen property. The crook is looking for another location. The most elderly patriarch of the Philo Vance Detective Agency is 12.

Sparks and Flashes

Dentists call gold, silver and platinum "noble" metals and sell them for perfectly royal prices. But, in addition to being good salesmen, many dentists are first class mechanics. Recently we had one do a welding job on a partial plate made of some vague alloy of these noble metals. With a little alternating-current welder, a carbon electrode, hard solder and a piece of the alloy, he did a creditable welding job. The service record of the weld is good so far. It has withstood a barrage of popcorn and shows no corrosion fatigue from five kinds of Scotch.

* * *

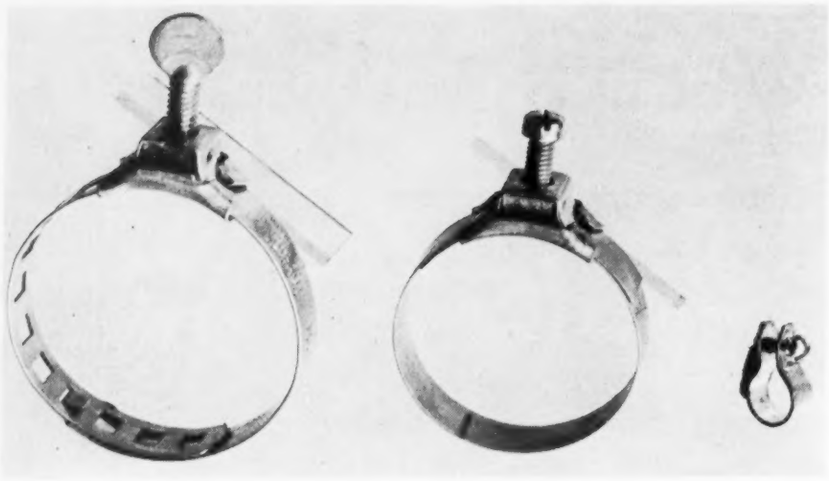
In welding technique, three states of substances are recognized: Elastic, plastic, molten. No welding is done with a substance in the elastic state; joints must be made by mechanical means—cement, brazing or soldering. In the plastic state welds usually are made by pressure or forging, but not necessarily so. In the molten state, welds are self forming or autogenous.

* * *

Electropercussive welding of wires for radio tubes involves heating of metal of the ends to the molten state, pressing the ends together to squeeze the molten metal out, welding in the plastic state; all of which takes place in about 0.001-second.

* * *

Glass was torch welded by what is now called autogenous welding 100 years before steel was invented.



—Courtesy Wittek Mfg. Co., Chicago

Three types of hose clamps made from cold-rolled strip steel. Manufacture of such clamps is estimated to account for upward of 1500 tons of steel annually

LARGE USES OF STEEL IN SMALL WAYS

289th Article ◆ Hose Clamps

CLAMPS find extensive use in providing a leak-proof connection between hoses and fixtures. These clamps generally are made from flat-rolled steel having a thickness which gives sufficient flexibility to permit them to be drawn tightly around the hose, but which at the same time is strong enough to hold under pressure. It is estimated that manufacture of hose clamps involves the consumption of more than 1500 tons of steel annually.

The largest single market for hose clamps is the automotive industry. Automobile engines usually require from four to eight clamps, so that indicated requirements of the industry for new car manufacture alone this year will be around 20,000,000 clamps. Replacement business for motor cars also is heavy, being estimated in normal times at about 20 per cent of the number of clamps in service. While repairs have been neglected somewhat the past several years, replacement demand is placed at around 20,000,000 clamps annually.

Engine Uses Numerous

Airplane engines represent another substantial market. Clamps are used widely for engines of both the air-cooled and water-cooled types, oil line as well as water hose connections being sealed in this manner. Internal combustion engines for other purposes provide additional markets. A variety of uses for clamps also exists in other industries for miscellaneous hose connections. Heavier clamps, such as those employed on railroad equipment frequently are in the form of malleable castings.

Market for Strip Steel

The more popular type of clamps is made from cold-rolled strip steel and usually is galvanized or cadmium plated. In the latter instance it is stamped from coated stock. The clamp consists of a strip which is either fixed in length or is adjustable for different diameters of hose, with some sort of a screw attachment for tightening the joint after the clamp has been fitted in place. Several typical hose clamps are illustrated. The largest is the adjustable type, having slots around one-half the circumference into which a hook on the other end of the strip is caught after the desired diameter has been selected. Tightening the thumb screw and nut shortens the effective circumference of the clamp and causes it to put equal pressure at all points. The unit illustrated will fit hose ranging from 1⅝ to 2⅝ inches in outside diameter. Larger sizes also are available.

A similar principle of operation is employed by the second largest clamp shown, but this type is not adjustable in diameter, being adapted for fast assembly on original equipment. A machine screw is used instead of a wing screw to tighten the connection. Hose clamp sizes generally range from ½ to 3½ inches inside diameter, these figures being the maximum diameter of the clamp when expanded. Common sizes of strip used for hose clamps are 0.015 to 0.030-inch thick and ¼ to ½-inch wide.

Stainless Steel Scoops Used In Curing Sealskins

A novel use of 18-8 stainless steel sheets has been developed recently in Alaska by Fouke Fur Co., large processor of sealskins. For use in salting down the seal skins after they have been scraped, various types of metal shovel scoops have been experimented with, but the corrosive effect of the salt dictated use of a corrosion resistant steel. The scoops being used are of narrow mouth, hollow back type, blade measuring 12½ inches by 6½ inches and weighing approximately 6 pounds. Wood Shovel Co., Piqua, O., manufactures the shovels from 18-8 chrome-nickel steel sheet stock supplied by Allegheny Steel Co., Brackenridge, Pa.

Preparation of sealskins generally is done in the two Alaskan islands of St. Paul and St. George. Skins are removed from the seals and blubbered, involving removal of fatty substance which remains close to the skin and which contains seal oil. After the skins are blubbered they are cured in salt by laying the skin down and shoveling about an inch of salt on top of it, then laying another skin and another layer of salt. Sometimes skins are piled as high as 700 feet and it is in this operation the stainless steel shovels are used in distributing the salt for the curing process. Skin curers have found that a shovel which will rust has deleterious effect on the skins being processed.

New Ferro-Carbon-Titanium Contains Aluminum

Ferro-carbon-titanium with an aluminum content has been developed by the Titanium Alloy Mfg. Co., Niagara Falls, N. Y., and a number of manufacturers of forging steels and of controlled grain size steels are experimenting with it. The new ferro-alloy, it is stated, permits the steelmaker to add aluminum in more diluted form so that its effect will be more uniformly distributed throughout the bath. It also is stated that, in this form, the cleaning effect of the titanium, in removing the alumina, becomes more immediate. The new ferro-alloy contains about 15 to 20 per cent aluminum, 12 to 15 per cent titanium, 4 to 5 per cent carbon and 3 to 4 per cent silicon.

Spray System Facilitates Descaling of Steel

PROGRESS in the steel industry has resulted in constantly higher quality, more accurate gages and better finish. Fabricators of metal products have benefited by these improvements in many ways. Better surface finish, for example, results in a decrease in the number of manufacturing processes and a higher standard of products.

Scale, which is the most frequent cause of surface roughness, forms on the surface of the steel while being heated, and continues to form rapidly during the rolling processes until the steel temperature falls below a red heat. The physical characteristics of this scale are such that it does not elongate with the steel being rolled, but flakes off. The scale also is harder than the metal at rolling temperatures and is pressed into the surface as it passes through the rolls. It may also mar the rolls themselves and cause further blemishes in the metal. When acid is used to remove scale, indentations frequently remain on the surface which neither cold rolling nor leveling will entirely close up to give a satisfactory finish. The surface finish is improved greatly and the cost of rolls reduced if proper means are employed to prevent scale contacting the mill rolls.

Modern heating furnaces and the methods of breaking the scale on the newer mills have done much to reduce the problem. Sheets and tin plate, being used for a variety of purposes where high finish is required, need an exceptionally smooth surface. The problem in the 2-high sheet mill was not extremely difficult since rolling temperatures could be kept low, but with the advent of the continuous wide strip mill, where the steel is heated to high temperatures in slab form, it became serious. Scraping the bar with Stellite cutters, immersing in water, and spraying, have been tried on continuous mills for years, but the last method has been developed lately to a high degree of perfection.

IMPROVED methods of descaling steel have played an important part in the improvement of finished surface for sheets, bars, rounds and other finished steel products. The accompanying article describes in detail the descaling system now in use in many of the large modern steel producing plants of the country

Spraying involves three methods of removing scale: First, the impact action of the high velocity jet; second, the explosive action of the water forced into the pores of the scale and turned to steam by the heat of the metal; and third, cooling of the scale to a lower temperature than the metal beneath which results in contraction and a break in the bond between the two. All three effects help, and with modern spraying methods, a high degree of scale removal is accomplished.

A layout of a descaling system for a wide strip mill is shown diagrammatically in Fig. 1. This arrangement is applicable to a rod or other mill where high finishes are desired, and the descaling is just as effective. Water is supplied to the pump, which may be either centrifugal or reciprocating, through a fine mesh strainer to remove as much of the grit as possible. If a centrifugal pump is used, a by-pass and valve (E) are installed. This valve is controlled automatically either by an increase of pressure and dead shut-off of pump, or by an increase of temperature. The valve is opened when all spray valves are shut, to prevent overheating of the pump due to the churning of the water in the pump. Wtih a reciprocating pump a start and stop control operated either by the pressure or the height of the accumulator is used. A check valve is placed between the pump and accumulator. The accumulator may be either of the dead weight type (used mostly in connection with an old hydraulic system) or the air bottle type.

Compressor Is Required

In the latter case, an air compressor is used to charge it. A stop valve usually is installed in the main discharge line to facilitate repairs on the piping. Individual branch pipes are run to the points selected for spraying the material. Each branch has a stop valve (A) and a spray valve (B) before the two lines branch off to spray the upper and lower sides of the strip. Nozzles are placed in these lines to direct the water against the surfaces. Such are the main essentials of the equipment required, which may be

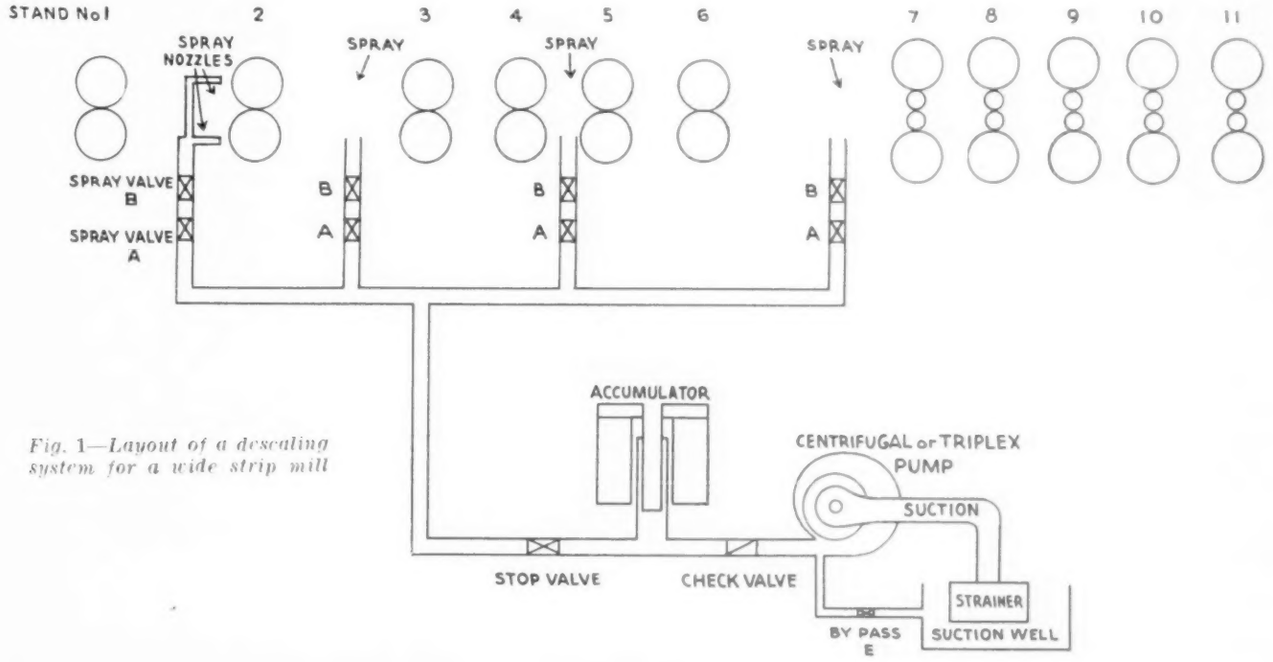


Fig. 1—Layout of a descaling system for a wide strip mill

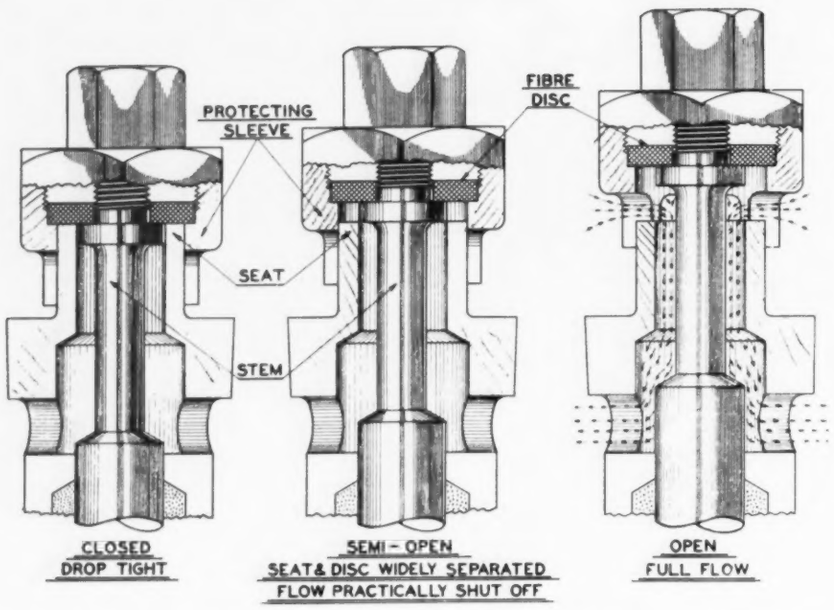


Fig. 2—Principles of design of spray valve showing the closed, semi-open and open positions

modified to suit any type of mill or the amount of descaling required.

Water pressure in various installations ranges from 800 to 1300 pounds per square inch. The quantity of water, the number and size of nozzles, and the locations of the spray pipes can be decided only on a basis of the individual mill. This will depend not only on the kind of steel and the surface condition of the steel (amount and type of scale actually formed in the heating furnaces) before entering the mill, but also on the finish desired. A 72-inch broad strip mill may require as much as 700 gallons per minute for each stand at the peak when using all valves at one time, which gives an idea of the magnitude of such a system.

As the passage of the steel through the mill is not continuous, it is desirable to keep the spray valves closed during the idle periods to reduce the necessary pump activity. Ordinarily, the valves are opened and closed for each piece. If a mill rolls 60 pieces an hour the spray valve will go through about 24,000 cycles per month. At 1000 pounds pressure, this requires a ruggedly designed valve. Sources of water supply in steel plants are seldom free from grit and dirt, which makes the duty of the valves more difficult if leakage is to be avoided.

Valve Design Details

Figure 2 shows the principles of design of this valve. The valve is of the poppet type, employing a fiber disk to seat against a metal seat. In addition, however, it also employs a close fitting sleeve and plunger construction (0.003 to 0.005-inch maximum tolerance—depending on size, etc.) which gives a combination of piston and poppet valve results.

The close fitting sleeve and plunger telescope around and inside the neck of the seat or seat bushing in the opening and closing movements of the

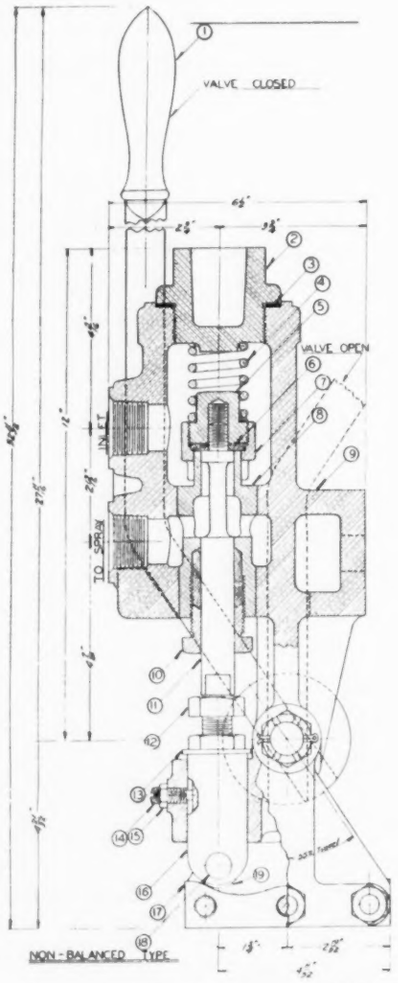


Fig. 3—Cross section of a 1½-inch hand-operated spray valve built with the protected seat principle

valve, cutting off practically all flow of water even when the main seat and disk are separated widely. Therefore, the actual or real seating elements make contact with practically no water flowing. The results are absence of cutting or wire drawing of the seating elements, long periods of leakless service, and low maintenance. This principle has proved its worth many times in actual service.

Soft seats are used and the seating elements last for several months. In case of repairs, no grinding is required and only a few minutes work is required to change a complete stem assembly.

Built for Severe Service

A cross section of a 1¼-inch hand-operated spray valve is shown in Fig. 3 with the protected seat principle incorporated in the design. The valve is built to withstand the severe service necessitated by the type of installation on which it is used. Close machining tolerances are employed. Balanced valves are used on 1 and 1¼-inch spray valves, although ¾, 1 and 1¼-inch operating valves also are balanced where pressures are higher than 1500 pounds per square inch. On 1½ to 8 inch sizes, nonbalanced valves of the hydraulic remote control type are used. The valves are 2-way for the usual spraying systems, but 3 and 4-way valves are available for other purposes. A 4-inch 2-way protected seat valve is shown in Fig. 4. Units of this size can be hand pilot controlled. The illustration shows one actuated by a hydraulic piston controlled by a small pilot valve. In this case, an electric thrustor is used to move the pilot valve. The small fittings on the supply lines are throttle valves for the purpose of holding back the flow of water to permit the valve to close slowly, and avoid a slam. If it were not for these small throttle valves, equipped with what might be termed microscopic holes, the water would flow through the pipe so fast that the valve would close noisily. Smaller valves may be operated directly by the electric thrustor. Several of this type are shown in Fig. 5.

Valves operated directly by a thrustor are made in all sizes up to and including 2½ inches. Those from 3 to 8 inches require thrustor-operated pilot valves.

The cost of pumping at 1000 pounds pressure of hydraulic descaling systems and the extreme velocity and splashing of the water makes it inadvisable to operate the spray unless steel actually is passing through the mill. Both hand and automatic operation are possible. Where hand operation is used, the operator of the mill motors usually takes care of all the sprays. Although automatic operation is used on relatively few mills, it offers many advantages. Where desirable, an automatic installation may be connected easily, by attaching an electric thrustor or solenoid air control on an

air controlled valve. This impulse may be transmitted by air, electrically or mechanically to the pilot valve, or thrustor, should the spray valve be of small size. An electric actuating impulse may be obtained from a push button, a flag switch, a photoelectric cell, or motor-current surge. The selection of the automatic operating medium must be decided on the merits of each individual system.

Water hammer has been one of the most troublesome problems of spray systems, especially where large volumes of water are used. The practically instantaneous closing of the valves caused a pressure jump, which has been known to reach at least six times the normal pressure. The hydraulic control patented by the Homestead Valve Mfg. Co., Coraopolis, Pa., introduces adjustable orifice valves into the line controlling the operation of the main valve stem. With the proper adjustment of these valves, shock to the hydraulic system can be controlled and often eliminated completely even with extremely large valves. Thus, this particular feature not only protects the valve itself, but also guards the other hydraulic equipment against shock while the valve is operating.

Velocity of Water Important

In the design of a descaling system, full knowledge of the volume of water, the pressure and length of lines, should be obtained before deciding on the sizes of lines and valves. As explained previously, the velocity of the water is a vital factor in removing scale. While velocities higher than normal for water lines may be used, the friction drop should not be excessive. Valves should be purchased having a known pressure drop, and the manufacturer should be asked for this information, when data are being obtained on the design of a descaling system. The descaling effect, the cost of equipment, and the cost of power all must be taken into account before the most economical design can be reached.

Although various line velocities ranging from 15 to 30 feet per second are employed, the most efficient practice is to use a velocity of about 6 feet per second. The longer the pipe line and the higher the velocity, the greater the pile driving effect when this long column of water is stopped suddenly. As water hammer goes as the square of the velocity, there would be four times as much water hammer at 12 feet per second as at 6 feet per second; at 18 feet per second, it is nine times as great.

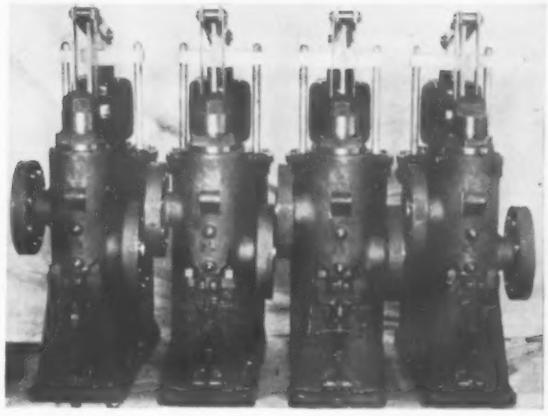


Fig. 5 — Direct electric thrustor operated — quick operating — shut-off valves for use as spray water control valves on a steel descaling system

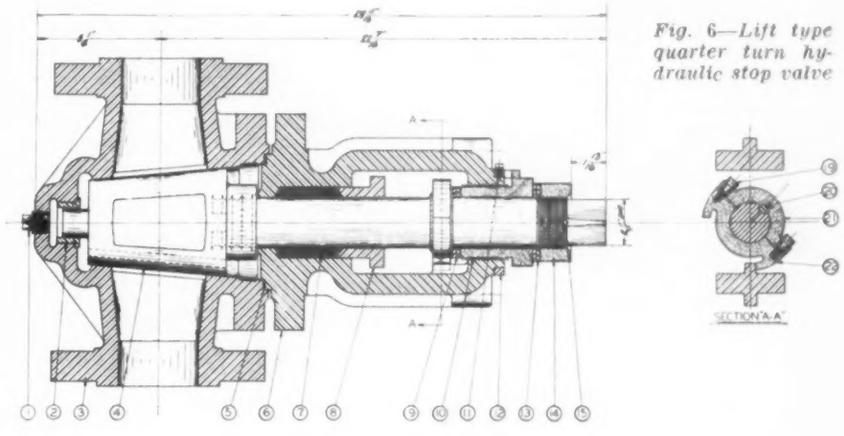


Fig. 6—Lift type quarter turn hydraulic stop valve

Nozzles should be designed to transform the highest percentage of pressure to velocity and flow the water uniformly on the strip. At 1000 pounds pressure, the velocity of the water is about 4 miles per minute. Any grit in the water has a tremendous erosive power on the nozzles. Eroded nozzles have a low efficiency and consume a large quantity of water; in addition, the scale is not removed effectively. Nozzles are available which have high efficiency and a long life. They also may be repaired easily in case of wear. They may be blocked off to adjust the number of sprays used according to the width of material being rolled.

Stop Valves Permit Repairs

Stop valves in each spray line and in the main discharge from the pump are shown in Fig. 1. These are necessary on account of repairs to the spray pipes or nozzles caused by cobbles or other accidents and to prevent a complete shutdown of the system. The valves should offer as little frictional resistance to the water as possible; the seats should be protected from corrosion or erosion caused by acid or

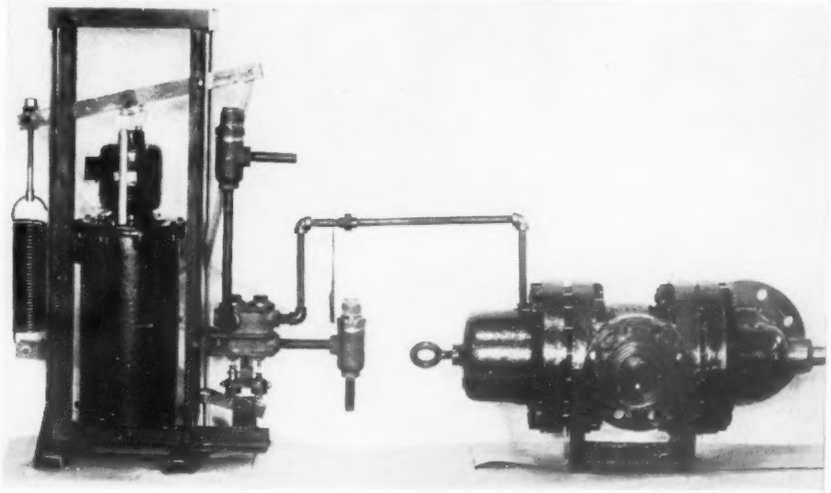


Fig. 4—Hydraulic quick-operating shut-off valve in conjunction with electric thrustor-operated hydraulic remote control pilot for pressures up to 1500 pounds per square inch. This construction is equipped with patented main valve control system for reducing or eliminating line shock on closing of the large main valve

grit and they should be capable of being closed easily and rapidly.

The lift type quarter-turn hydraulic stop valve shown diagrammatically in Fig. 6, has all the necessary qualifications for this service. The lower operating handle moving the nut in the yoke, lifts the plug from the seat a few thousandths of an inch, and the upper valve handle then may be swung 90 degrees. By this arrangement the valve is opened or closed without friction against the seat. The lower handle then is pushed around to the tight position, pressing the tapered plug tightly into the valve body. The valve then is "drop tight" when closed, and the seats are protected effectually when open. The valve cannot jam and only a slight manual effort is required to close or open it, no matter how long it has been standing in either position. The seating areas, which are ground accurately, stay in perfect condition because there is no rubbing of surface against surface, thus preventing any cutting should fine grit become embedded in either face. Fig. 7 shows a 4-inch valve of this type. The lower handle lifts the valve and the upper turns it to either position.

The quarter-turn principle makes positive opening and closing practically instantaneous. The position can be seen quickly. For high pressures, heavy and well-ribbed bodies are employed to withstand the pressure.

If the modern descaling system is well designed and installed with the proper equipment, there will be comparatively few delays and little attention and maintenance will be required. If poorly designed equipment is used, however, delays and mechanical repairs will be numerous and the product of the mills will be below the standard in surface quality.

Replaces Engine Driving 126-Inch Plate Mill

Central Iron & Steel Co., Harrisburg, Pa. recently replaced the original steam engine driving its 126-inch plate mill with a 34 x 54 x 60-inch tandem compound steam engine of the same type, the work having been accomplished within a month.

Installation of the driving unit necessitated the removal of more than 650 tons of foundation and excavation for the new foundation which contains about 550 cubic yards of concrete. The new engine weighs in excess of 200 tons and is built with an 80-ton flywheel. It operates at 74 revolutions per minute and develops 33 per cent more horsepower than the initial unit.

Continuance of steam power conforms to the policy of the company in utilizing the waste-heat steam obtained from the open-hearth and mill heating furnaces. The company also maintains an auxiliary steam boiler plant to assure a continuous supply and maintain the desired pressure during periods of lower production when less waste-heat steam is generated. Coal dredged from the Susquehanna river, which borders the plant property, is used as fuel.

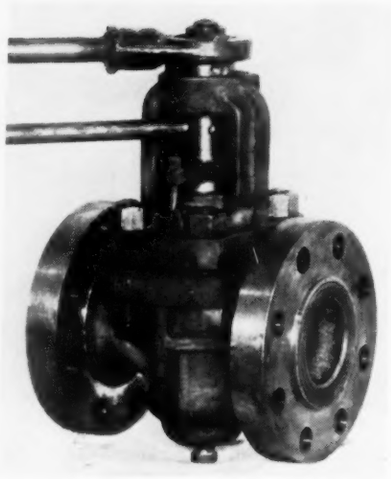


Fig. 7—Two handle lift type hydraulic stop valve (4-inch) for pressures up to 1500 pounds per square inch. The straight through passage provides the minimum pressure loss possible

Bearing Requirements for Russian Mill Are Placed

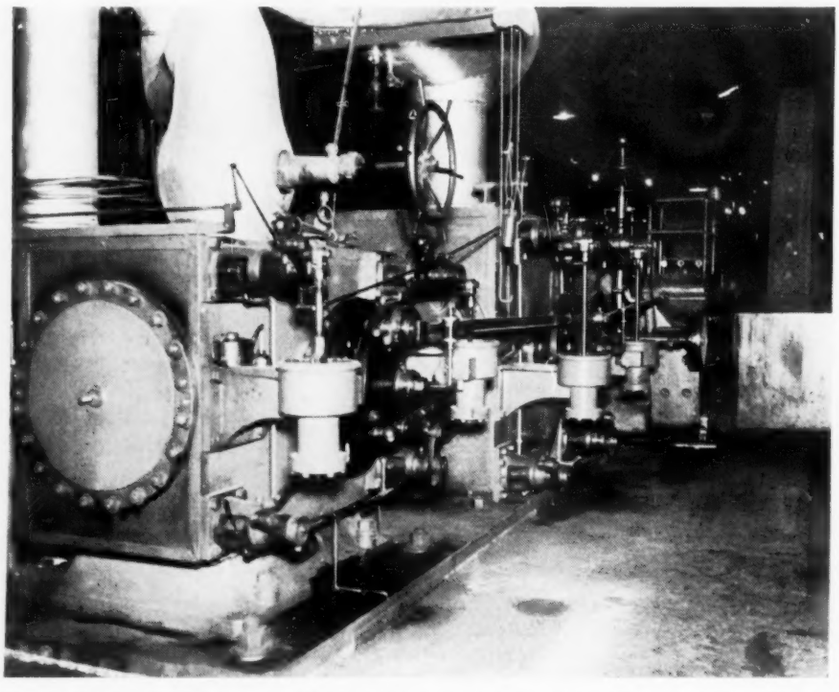
All bearings for the 4-high broad sheet mill now being built at Zaporostal, Russia, under contract with the United Engineering & Foundry Co., Pittsburgh, including those for the 4-high cold mills, the 2-high planishing mills, as well as all drives for these units, and the pinion stands for the hot mill, flying shears and reels are being furnished by SKF Industries Inc., Philadelphia. The largest size roller bearings are 27½-inch bore and 46½-inch diameter. The mill also will be equipped with pressure recording gages. The order for the bearings was placed by the Amtorg Trading Corp., New York.

British Institute Study Of Problems of Corrosion

Third Report of the Corrosion Committee; paper, 214 pages, 5¼ x 8¼ inches; by a joint committee of the Iron and Steel institute and British Iron and Steel Federation to the Iron and Steel Research council; published by the Iron and Steel institute, London; supplied by STEEL, Cleveland; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

Interest in the subject of corrosion of steel gives this report much importance at present and the exhaustive character of its investigations throws much light on various phases of the destruction of steel under various conditions.

The report was presented for discussion at the annual meeting of the Iron and Steel institute in London, May 1. It considers atmospheric corrosion, marine corrosion and corrosion resulting from industrial and other uses.



New Corliss type steam engine which recently replaced the original unit for actuating a 126-inch plate mill in Pennsylvania

Tentative Plating Standards Approved by Electroplaters

TENTATIVE standard specifications for various types of electrodeposited coatings on steel and other metals were approved at the twenty-third annual convention of the American Electro-Platers' society held in Bridgeport, Conn., June 10-14. These specifications, prepared as a result of research by a joint committee representing the Electro-Platers' society, the American Society for Testing Materials and the national bureau of standards, were reported by the committee with a recommendation for approval.

No definite specifications have been available as to what constitutes fair electroplated coatings. Work now done has a deposit of the character and thickness that any manufacturer may think will be acceptable to the trade and one which will not materially increase the cost of production. When finally adopted, the proposed specifications will set a standard of quality that can be marked on the goods thereby giving definite information to the consumer as to the quality of the products being purchased.

Summarized, tentative specifications for electrodeposited coatings of nickel and chromium on steel, cover two types of coating, one for general use and the other for mild service. Steel to be plated should be substantially free from flaws or defects that are detrimental to the final finish. It shall be subjected to such polishing, cleaning, pickling and plating procedures as are necessary to yield deposits with the desired appearance and quality. The use of copper as an initial or intermediate layer is optional.

Thickness of finished deposits for general service: Nickel and copper: On significant surfaces of the finished articles the minimum thickness of nickel, or of the combined layers of copper and nickel, shall be not less than 0.00075-inch, and if copper is used, the minimum thickness of the final nickel layer shall be not less than 0.0004-inch.

If a chromium finish is specified, the minimum thickness of the copper and nickel on significant surfaces shall be as above, and the average thickness of the chromium shall be not less than 0.00002-inch.

Thickness for Mild Service

For mild service, on significant surfaces the minimum thickness of nickel, or of the combined copper and nickel layers, shall be not less than 0.0004-inch, and if copper is used, the minimum thickness of the final nickel layer shall be not less than 0.0002-inch. If a chromium finish is specified, the minimum thickness of the copper and nickel shall be as above and the average thickness of the chromium shall be not less than 0.00002-inch.

For many articles the minimum thickness of chromium is more significant, but the average thickness has been specified pending the development of satisfactory methods for measuring the minimum thickness.

The salt spray test should be conducted with a 20 per cent solution of sodium chloride (specific gravity 1.15) under conditions that produce a dense fog throughout the container, without the spray being blown directly against the specimens. The latter shall be supported by glass or other insulating material. The temperature in the box should be kept by thermostatic control at about 95 degrees. This is about the lowest temperature that can be maintained throughout the year without artificial cooling. The solution formed by condensation of the spray should be drained off and not used again.

Control Current and Time

Any specified average or minimum thickness of plating can be produced consistently only if the current density and time of plating are controlled. Regulation of the voltage is of no value except so far as it produces the desired current density.

The current and time required to produce a certain minimum thickness of any metal will depend upon the shape of the article, the shape and position of the anodes, and the throwing power of the solution. General experience indicates that average thicknesses of at least 0.001-inch and 0.0005-inch will usually be required to produce the respective minimum thickness of 0.00075-inch and 0.0004-inch of nickel plus copper. For complicated shapes, longer periods will be required, which must be determined by trial. When a large number of small articles are plated simultaneously (on racks or in barrels), the time of plating must be increased to insure the specified thickness on those articles that receive less than the average current density.

To deposit an average thickness of 0.001-inch of either copper and nickel in acid baths with 90 per cent efficiency, requires about 21 ampere-hours per square foot. In the cyanide copper bath only about 10 ampere-hours per square foot are required if the efficiency is over 90 per cent. Practically, however, the efficiency in cyanide baths may be only 50 to 70 per cent, so for illustration the above figure of 21 ampere-hours per square foot will be retained for all the copper layers. The losses in buffing may vary from 10 to 20 per cent. If the latter value is assumed for safety, this will necessitate the use of 25 ampere-hours (1500 ampere minutes) per square foot to yield an average thickness of 0.001-inch.

Minimum thickness of deposits of zinc on steel are recommended as being 0.0005-inch for general service and 0.00015-inch for mild use. The average thickness of deposit will depend upon the shape of the article, the shape and position of the anodes, and the throwing power of the solution. Purely for

Welders Join the Navy

WORMSEYE VIEW of two files of "shield arc" welding machines as they come off the production line at the Lincoln Electric Co., Cleveland. The units shown here await shipment to various navy yards throughout the country

illustration, it will be assumed that the average thickness will be 50 per cent greater than the minimum thickness. The resultant figures serve only as a rough guide and must be confirmed by trial for the articles concerned.

To deposit 0.001-inch of zinc with high efficiency in either acid or cyanide baths, about 14 ampere-hours per square foot is required. To produce an average thickness of 0.00075-inch, 50 per cent more than the minimum thickness of 0.0005-inch specified for general service, will therefore require about 11 ampere-hours per square foot. For mild service, about 3.5 ampere-hours per square foot will be required to deposit an average of 0.00023-inch of zinc, or a minimum of 0.00015-inch.

Complicated shapes will require longer periods When a large number of small articles are plated simultaneously, the time of plating must be increased to insure the specified thickness on those articles that receive less than the average current density.

Limits for Cadmium Plating

For the electrodeposited coatings of cadmium on steel, both for general use and mild service, the minimum thickness of the cadmium should not be less than 0.0005-inch, while for mild service the coating should be at least 0.00015-inch. By microscopic examination the minimum thickness of the cadmium should be determined, or some other method adopted.

For articles that are intended for a short period of use, no standard specification for plating is recommended. It is suggested, however, that subject to the prevailing manufacturing conditions, certain minimum requirements be mutually agreed upon to insure that the plated coatings render useful service.

Any specified thickness of plating can be produced consistently only if the current density and time of plating are controlled. Regulation of the voltage is of no value except so far as it produces the desired current density. The resultant figures serve only as a rough guide and must be confirmed by trial for the articles concerned.

To deposit 0.001-inch of cadmium with high efficiency, it requires about 10 ampere-hours per square foot. To produce an average thickness of 0.00075-inch, or 50 per cent more than the minimum thickness of 0.0005-inch specified for general service, it will therefore require about 7.5 ampere-hours (450 ampere-minutes) per square foot. This is equivalent to 1 hour's plating at 7.5 amperes per square foot or to a corresponding period for any other current density. Similarly for mild service, it will require about 2.5 ampere-hours per square foot to deposit an average of 0.00023-inch of cadmium, or a minimum of 0.00015-inches.

An interesting paper on black nickel plating was given by Joseph L. Downes, Remington-Rand Inc., Middletown, Conn., in which he outlined the history of black nickel plating briefly. The first solution in 1904 resulted in a formula so well constructed it has not been necessary to change it materially except for extra heavy coating. This formula, as used by the Remington-Rand plant, is in a 2500-gallon solution in a semiautomatic plating machine. The importance of the chemical control of the solution, especially as to the sulphur content, was stressed by Mr. Downes, who gave the analyses of the deposit and that of the solution.

Reports Co-operative Research

Dr. William Blum, national bureau of standards, Washington, gave a report on research work of the bureau co-operating with the various societies interested, and the results of this research are summarized in the tentative specifications approved.

In addition to several evening sessions, several plant visitations were arranged to plants of the American Tube & Stamping Co. and Bridgeport Brass Co., Bridgeport, and the International Silver Co., Meriden, Conn. R. J. O'Connor of the Bridgeport branch of the society was general chairman in charge of the entire convention.

A. P. Munning, Hanson-Van Winkle-Munning Co., Matawan, N. J., outlined the development of machinery and equipment in the electroplating industry, showing how constructive progress had been attained by the manufacturer of such equipment closely co-operating with the plater.

Hardening Tool Steels in Controlled Atmospheres

(*Concluded from Page* 32)

as described in this paper. But if gas of a different analysis is supplied to the burner, it will be necessary to clean up the Orsat or similar gas analyzing equipment and experiment until an atmosphere is discovered which will duplicate or better the standards which have been set up by these experiments.

For those who are interested in finding an atmosphere for tool steels that will not scale or decarburize in any locality or section of the country having gas, the author offers what he considers to be a logical solution to the problem. For the time being, ratios, moisture content, and the inert gas theories have been dismissed, and in their place atmosphere application has been substituted. Fig. 5 attempts to show the type of furnace and atmospheres which, according to the experiments, will harden without scale or decarburization and in any locality all classes of steels beginning with S.A.E. 1020 and finishing up with the complex molybdenum - tungsten high speed steels.

Referring to the schematic drawing of Fig. 5, the furnace can be of either the electric, gas, or oil-fired types, having a length of approximately 6 feet and a width of 3 feet. Through the length of this furnace, pass three square or rectangular heat-resisting sheet metal muffles of the following approximate sizes: 2 inches square, 4 inches square and 6 inches square. Size of the muffle is optional and should be designed for the particular needs of the work to be hardened.

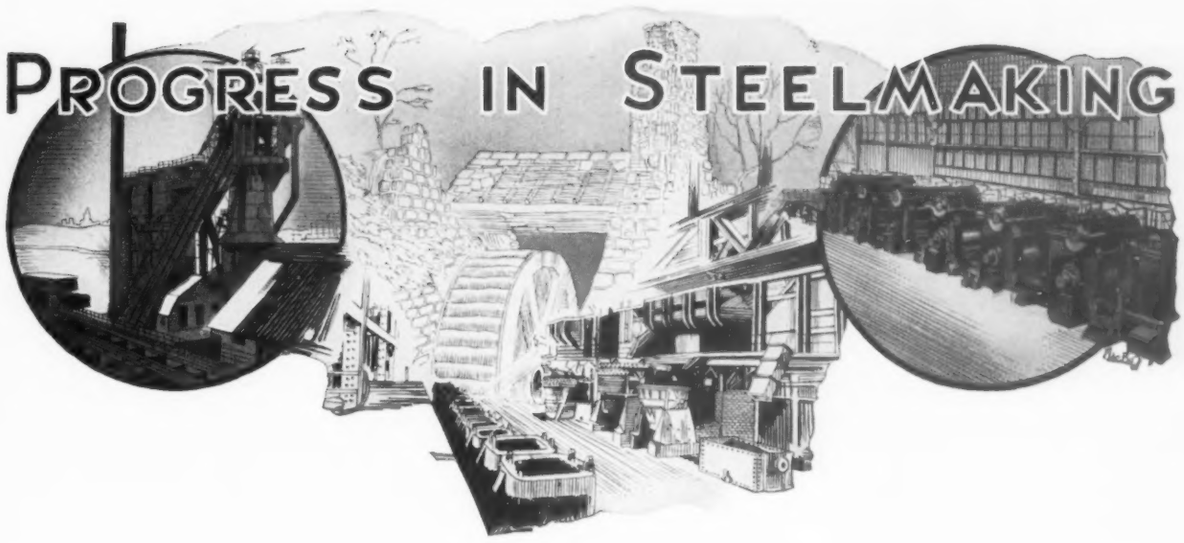
Three zones can be established by the hardener. For instance, the hardener could set the controls for 600, 1200 and 1600 degrees Fahr., or else 600, 1400 and 1800 degrees Fahr. This would depend largely upon the type of steels to be hardened. The required gas analysis of the zones indicated by Fig. 5 is maintained by a flow of air and gas ratios entering at the point marked "inlet."

For hardening tool steels in this type of equipment, all that is required is: (1) To set the temperature zones for the steel to be hardened; and (2) to turn on the atmosphere and start pushing parts to be hardened through the furnace. Instead of using the old method of first preheating the steel in a preheat furnace and then transfering the parts to the hardening furnace, all that is necessary is to place the tools into the preheat zone and then push the tools from that zone to the hardening zone.

Research Committee Plans To Aid Welding Industry

Engineering foundation, New York, has appointed a welding research committee to, first, initiate and conduct a critical review of world welding literature; second, to render modest aid to worthy individual projects functioning under the fundamental research committee of the American Bureau of Welding, and, third, to sponsor specific research investigations. The project will be started by funds contributed by Engineering foundation supplemented by funds and services supplied by industry; it is sponsored jointly by the American Institute of Electrical Engineers and the American Welding society.

Personnel of the research committee: C. A. Adams, Harvard university, chairman; William Spraragen, American Welding society, 33 West Thirty-ninth street, New York, secretary; J. H. Critchett, Union Carbide & Carbon Research Laboratories; J. J. Crowe, Air Reduction Sales Co.; H. M. Hobart, General Electric Co.; D. S. Jacobus, Babcock & Wilcox Co.; G. F. Jenks, army ordnance department; and F. T. Llewellyn, United States Steel Corp. Communications should be addressed to the secretary.



Increases Cutting Value

Impregnated coal gas in conjunction with oxygen is being employed in England for cutting steel. Savings ranging from 33 to 40 per cent are claimed. The gas produces a narrow cut without hardening the edges. The effect of the impregnation of the gas is to lower the ignition point and retard the propagation of the flame so that its cutting value is greatly increased. The speed of cutting various thicknesses of metal is increased at the rate of 1 inch in 4 inches.

• • •

Affords Quick Reading

A surface pyrometer intended for steel mill use where in many instances low temperatures have to be measured accurately is a newly developed instrument. The unit of the bow type is designed for measuring quickly and accurately curved or flat stationary surfaces. A clamping device causes the indicating needle to stop when high temperatures no longer have to be measured simultaneously. Extension handles are furnished to meet individual conditions. Various scales range from 30 to 1000 degrees Fahr.

• • •

Tests Pig Iron in Cupola Before Shipment

IRON FOR SPECIFIC PURPOSES: Cupola testing of foundry pig iron at the blast furnace is somewhat unusual but this is being accomplished at a research foundry operated on the cast house floor of a southern stack. Different variations of practice are introduced in commercial production foundries as a result of experimental work conducted at this research foundry. Trial castings are subjected to the most rigid inspection and physical tests. In addition, the effect of different variables encountered in the smelting of pig iron is studied by cupola tests. A portion of this research foundry, which is operated at the City Furnaces of the Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., is shown in the accompanying illustration

Introduces Tank Lining

High resistance to acids is claimed for an improved hard rubber lining for pickling tanks. The lining has a highly glazed surface and is bonded to a thin layer of soft rubber which is vulcanized to the steel tank, this providing an elastic connection to compensate for thermal changes and to protect against shocks.

• • •

Reduces Maintenance Cost

Track wheel maintenance of overhead cranes is minimized at a Buffalo steel plant through the use of rolled steel wheels. The blanks used for crane bridge and trolley wheels are heated and oil quenched, which gives a tough wheel and increases the wheel life materially.

• • •

Contributes to Uniformity

Adaptation of controlled furnace atmospheres to forging furnaces correlated with automatic control of temperatures is contributing to uniformity of physical qualities of forgings as well as to an improvement in the machinability, according to a metallurgist at an Ohio forge shop.

IMPROVING OPEN-HEARTH FURNACE DESIGN

by William C. Buell Jr.

Chapter II — Part III

Slag Pockets

THE semicircular arch develops little or no horizontal thrust, all of its static forces reacting vertically. The sprung arch develops considerable horizontal forces which must be restrained in the buckstay design. The gothic arch design of furnace F transmits nearly all of its static reactions vertically and was included for this reason.

The transverse cross sections of the slag pockets as presented are taken to show the supporting arch as it develops between uptakes. The end wall towards the fantails generally is developed differently especially in the case of the single slag pocket designs inasmuch as the gases are directed into separate fantails leading to two regenerator chambers.

The arrangement of the opening in this end wall is shown in Figs. 123 to 126 (to be presented in subsequent issues) at the left of each item. Here the dotted lines show the outline of the slag pocket area, A_9, and the full lines the outline of the fantail entrance, A_{10}.

Designed for Different Fuels

Slag pocket designs to incorporate the better features of current practice are illustrated in Figs. 115 and 116, the former being suitable for producer or preheated mixed gas firing, and the latter for use with fixed fuels. These arrangements continue the recommended designs of the prior work as shown in Figs. 57 to 60. (STEEL, July 10 and 17, 1933 issues.)

In offering improved slag pocket design it likely will be improbable that any recommended layout can be followed exactly as delineated and therefore while the layouts have been arranged to incorporate the best possible design without reference to unusual limitations, it is recognized considerable modification of the design will be required to properly adapt any new or rebuilt installation.

It is desirable that slag pockets be laid out to include the greatest possible degree of symmetry with reference to the furnace ends themselves, and the ensuing regenerators in order to smooth the flow of the gases and to simplify the brickwork. Thus the delineated double slag pocket design is shown so that the

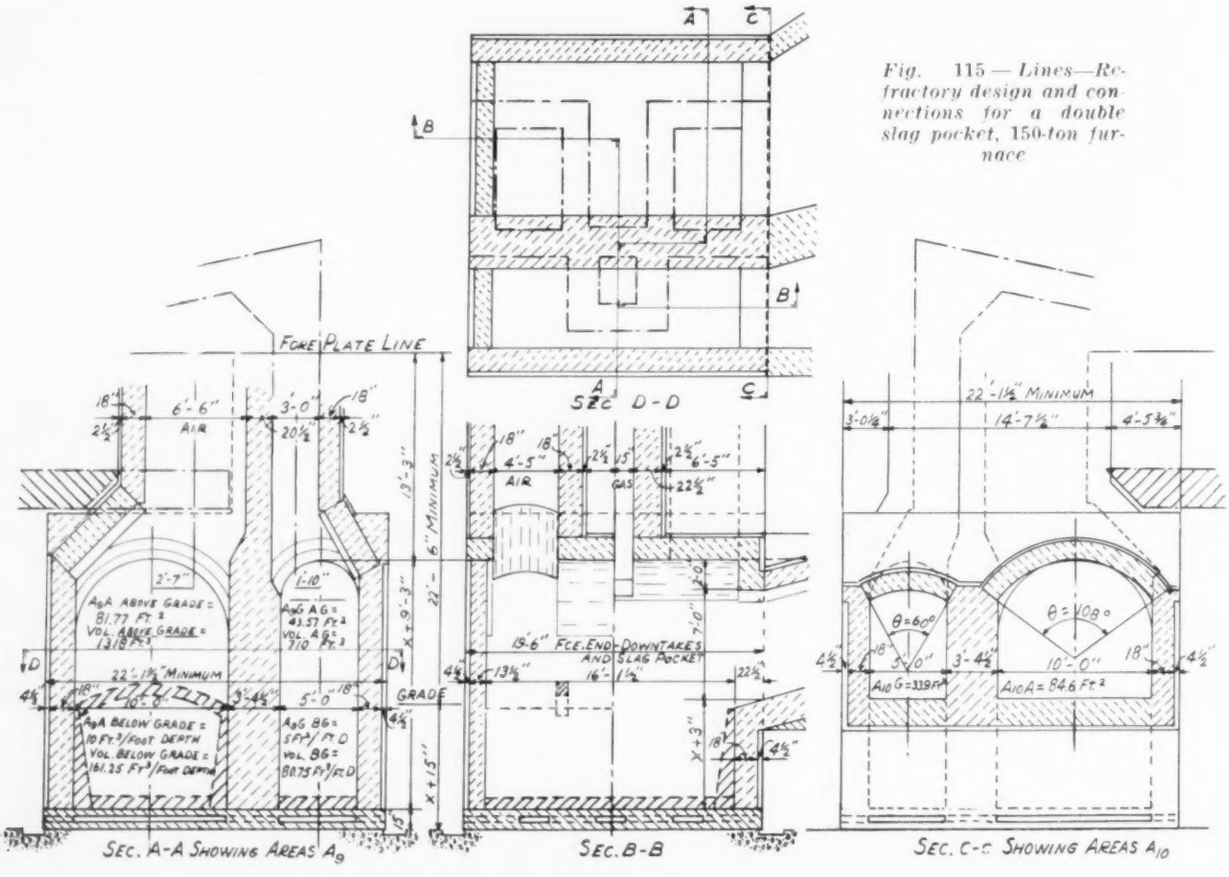


Fig. 115 — Lines—Refractory design and connections for a double slag pocket, 150-ton furnace

NEWS

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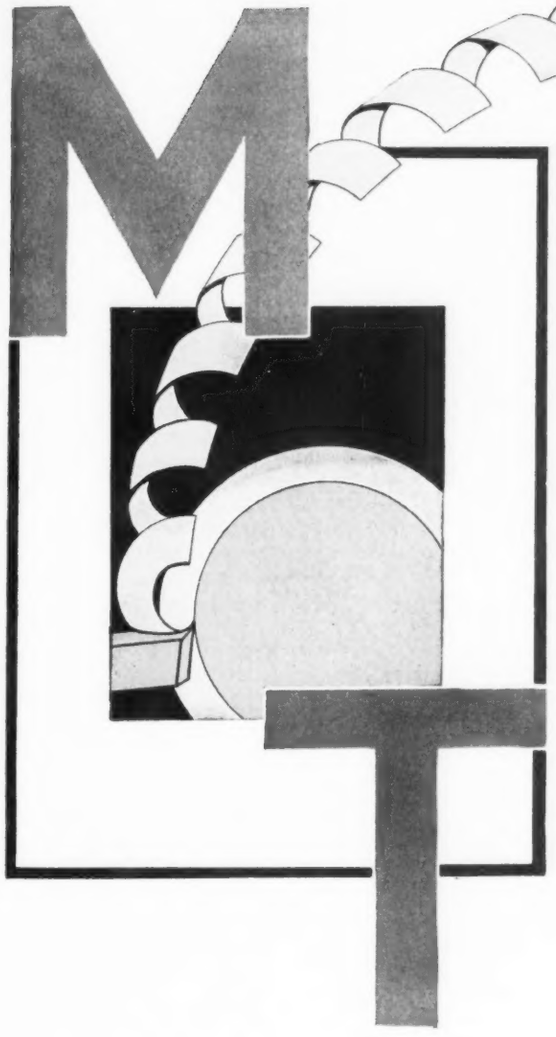

NEWS! The Machine Tool Show of 1935 will be the greatest industrial exposition ever held in the United States. It will occupy five acres under one roof.

NEWS! Ten days of startling modern mechanical parade in Cleveland's Public Auditorium, sounding the funeral march of obsolescence.

NEWS! All of the amazing developments of the past six years in machine tools and accessories—hundreds of machines in operation—the machines that, through their production of better products at lower costs, create expanded markets by making more goods available to more people.

●

Reduced railroad rates will apply for concurrent Machine Tool Congress—no advance in hotel rates. Interesting booklet on request—address 1220 Guarantee Title Building, Cleveland.

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CLEVELAND

SEPTEMBER 11-21 · 1935

center of the central wall is also the center of the end wall of the upper furnace and the center of the downtakes in the single arrangement is the center of the slag pocket.

Excepting as in the bottom, the principal refractory used in slag pockets is silica brick. The outer exposed areas of the pockets preferably are insulated with Class A insulation and covered either with 3/8-inch plate or panels of expanded metal as illustrated in Fig. 67 (STEEL, Aug. 14, 1933). The emission of radiated heat is approximately the same from surfaces of steel plate and exposed insulating material. It makes little if any difference thermally which arrangement is used. No inspection of the surface of the insulation is particularly necessary, so the choice may be left to convenience.

The bottom arrangement is an air-cooled pad, the design of which will be later described.

The space available for slag pocket width will be within the limits of the furnace supporting piers and the building columns. The greatest possible width as developing large areas and volumes should be taken.

Assuming that a double slag pocket, Fig. 115, fired with producer gas is to be designed to have a holding capacity of the carry-over from four hundred 150-ton heats, or 60,000 tons production, and further assuming from the prior discussion the pockets are to receive 13½ pounds carry-over per ton of ingots, then by reference to Fig. 114 it may be found that about 2700 cubic feet slag capacity is required at each end of the furnace or 1800 and 900 cubic feet capacity in the air and gas pockets, respectively.

Thus, having a developed transverse area in the air side which holds 161.25 cubic feet of slag per foot of slag pocket depth, the actual depth of the slag pocket below that area required to continue the free flow of the effluent gas will be a little more than 11 feet. No allowance is made for the volume occupied by false walls. This, however, must actually be included.

The double slag pocket width is here shown in the ratio of 1:0 for the gas pocket and 2:0 for the air pocket. Excepting in the case of furnace J this ratio is not held as delineated in the typical arrangements, Figs. 109 to 111. Consideration later is given to this ratio of width and area in the discussion on regenerators.

The depth in the single slag pocket, Fig. 116, required for the slag accumulation when firing oil or tar with 15 pounds carry-over and necessitating 3000 cubic feet storage capacity may be found as that figure divided by 258, the slag pocket area per foot of depth, or a little more than 11½ feet of depth.

With reasonable care in layout, slag capacities should be developed without difficulty that will allow the maintenance of areas sufficient for

Explains Ambiguity

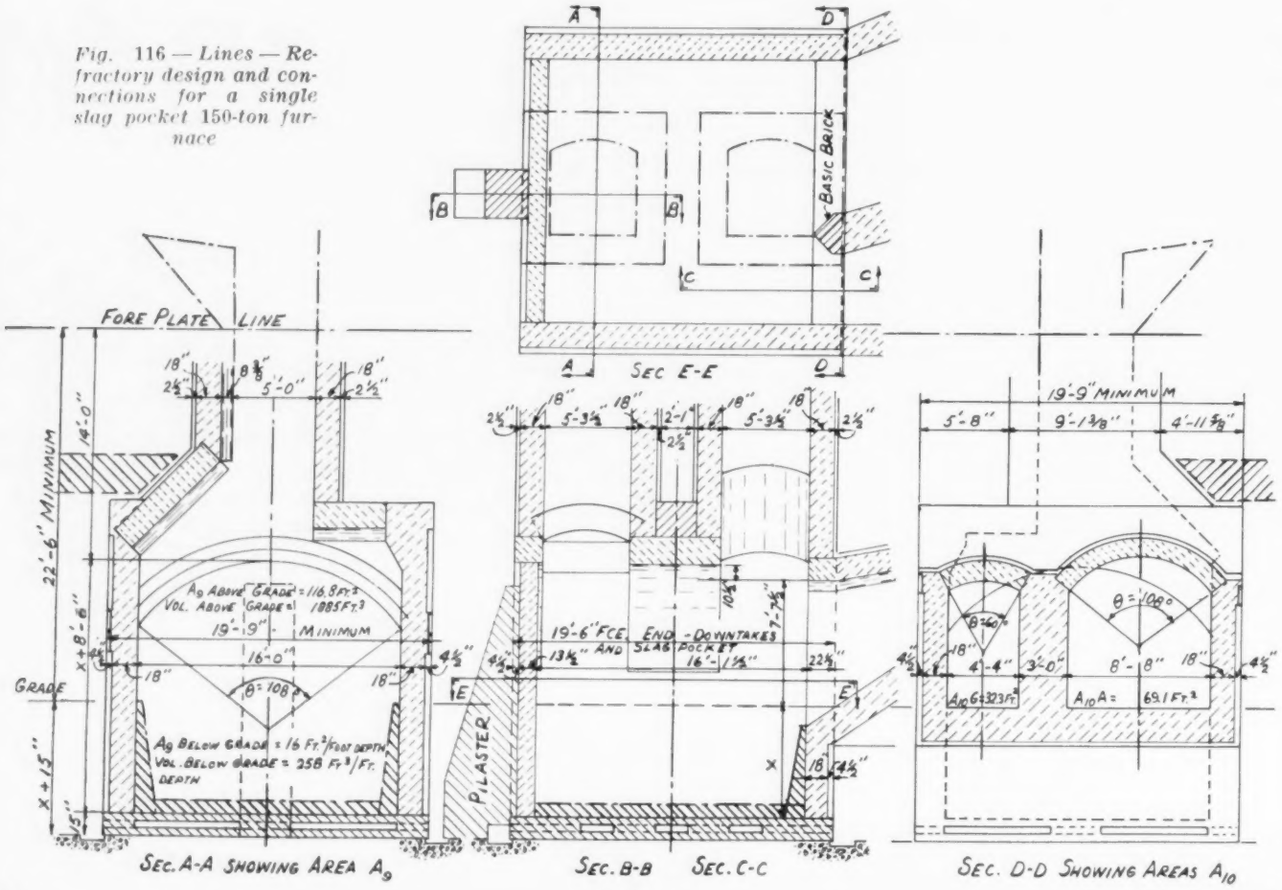
OWING to the fact that the present series of open-hearth articles contains occasional references to the original series, which appeared in STEEL, *from Oct. 3, 1932, to Aug. 14, 1933, it seems desirable to explain the relationship which exists between the original and revised texts of these series.*

The original articles (STEEL, *Oct. 3, 1932—Aug. 14, 1933), have been revised, amplified and greatly expanded for publication in two books, the first of which will be published in a few months and the second shortly thereafter. The series now running in* STEEL *later will be published in book form as Volume III to complete the trilogy.*

In the current series, where references to the original series are made, the author has worked from the manuscript of Volumes I and II rather than from the original text. Accordingly, where no or only slight revision of the data of the original articles has occurred reference may be made to such in the current series, but where the revision of the data has been substantial, or if the reference is to material which is new in the book manuscript, then the reference of necessity is made appropriately to the text of the forthcoming Volumes I and II.

THE EDITORS

Fig. 116 — Lines — Refractory design and connections for a single slag pocket 150-ton furnace



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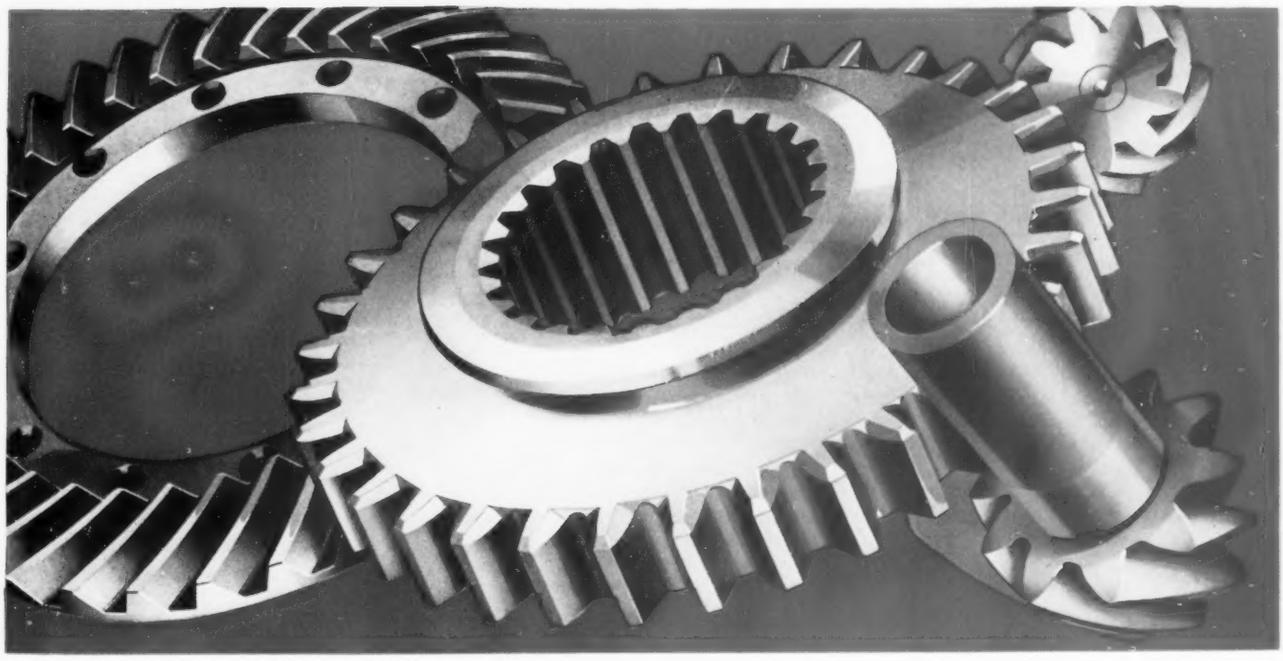

Republic Steel

CORPORATION

CENTRAL ALLOY DIVISION, MASSILLON, OHIO
GENERAL OFFICES: YOUNGSTOWN, OHIO

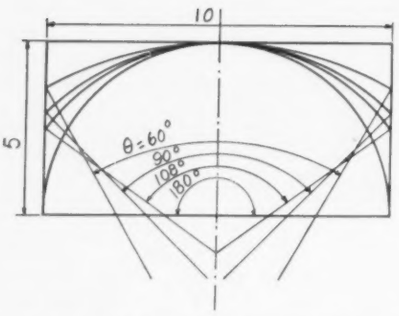

Fig. 117—Chart indicating loss of area in a similar rectangle through use of arches having selected included angles

nonrestricted gas flow during a campaign of any estimated or accomplished length.

In the previous writing it was demonstrated that an arch of little depth with no loading other than its own weight is best designed having Θ the included angle at 60 degrees as in the main roof of the furnace. The areal encroachment of this type of arch of a rectangle which will contain it is nominal but the horizontal forces developed in its restraint are considerable.

Requires No Lateral Support

The semicircular arch $\Theta = 180$ degrees commonly is used for the roof of the double slag pockets. This design is satisfactory in furnace use only when carrying superimposed loads and it encroaches materially on a rectangle which might contain it. No horizontal forces are developed and consequently lateral support is not required. This is the only advantage found in its use. Where the spans do not exceed 10 feet, its inclusion in slag pocket design is convenient.

Offers Many Advantages

However, with wider spans, the sprung arch offers several advantages if the restraint of the horizontal thrust does not become a serious problem of steel design as would be the case if the 60-degree arch were to be used. Consequently, the arch having an included angle greater than 60 degrees but less than 180 degrees is more convenient from several points of view. Arches having $\Theta = 90$ or 108 degrees seem particularly convenient for inclusion in furnace design; where neither the 60 or 180 degrees may be used advantageously, the latter is to be preferred.

Certain factors regarding arches that are apropos to the discussion are listed in Table XCVIII. The rise per foot of span, column b, is from Table XXXIX (STEEL Jan. 9, 1933) The per cent of area lost in the several designs has been calculated and is delineated in Fig. 117.

The weight of ½W, column d, is in the case of the 60-degree roof taken from Fig. 65 (STEEL, Aug. 7, 1933) of the 90 and 108-degree designs from Fig. 118, and calculated for the semicircular arrangement.

The horizontal force, HF, column e, is calculated through the use of equation (7) (STEEL, Jan. 9, 1933) and the downward force DF, column f, by equation (10) STEEL Jan. 16, 1933).

Binding Is Important

Inasmuch as all of the slag pocket arches carry superimposed loads, which will react in the same ratio as the weight of the roofs themselves, it will be evident from an examination of Table XCVIII particularly with reference to the horizontal reactions that the inclusion of the arch with the greater included angle has advantages when the steel binding is designed.

The sections at the extreme right of Figs. 115 and 116 show the connection of the slag pockets and the fantails at areas $A_{10}A$ and $A_{10}G$. Even though the slag pockets are double or single the ancillary system is a double system from slag pockets to stack flue.

When using the double slag pocket arrangements the fantail connections are usually of the same width as those of the slag pockets with the 3 feet 4½ inches center wall continued as long as the two ducts are immediately adjacent.

In the arrangement for fixed fuel a 2-foot 7-inch or a 3-foot center wall is recommended where the ducts are immediately adjacent with the width of the entrances divided on a 1:2 ratio as shown.

The areas which must be developed at A_{10} are discussed in a later chapter.

The included angle of the narrower arch in both delineated cases, as will be observed, is 60 degrees, and that of the wider 108 degrees. While at the location as shown and within a securely bound wall, this design scheme has no particular significance, it is here included as the start of the fantail arches which must be so designed that the horizontal thrust of both arches may be nearly equal in order to prevent the collapse of the arch that might be the weaker.

Table XCVIII

Changes in Design Factors of Arches

Included angle Θ, degrees	Rise per foot of span, inches	% Area lost in rectangle 10′ wide, 5′ high	1 Foot length of 18″ thick roof with 10′ span—pounds		
			½W	HF	DF
a	b	c	d	e	f
60	1.604	8.66	1100	2061	1210
90	2.492	12.92	1160	1395	1395
108	3.057	15.36	1230	1209	1664
180	6.000	21.46	1830	....	1830

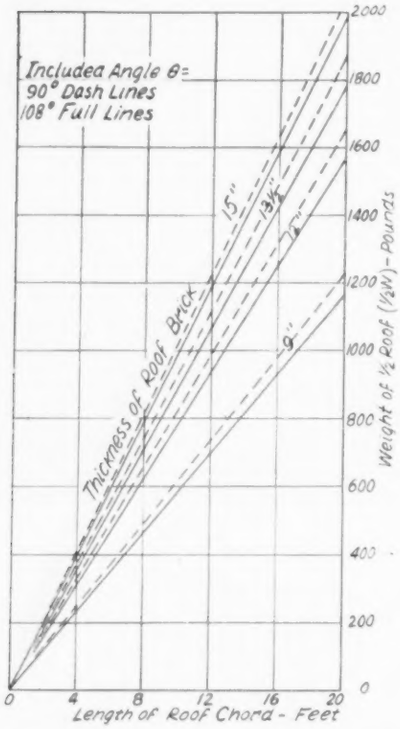

Fig. 118—Chart for finding one-half the weight (½W) of silica brick roofs per foot of roof length. For fire brick roofs add 10 per cent to values of chart

Skews Oppose Each Other

The horizontal force, column e, Table XCVIII, for a given included angle, varies directly as the span of the roof. Thus the skews of two roofs, each of 108 degrees and one of 5-foot and the other of 10-foot span, would oppose each other with horizontal forces of 604 and 1209 pounds, respectively, from which it is obvious that the roof of the narrower span might easily collapse because of the heavier thrust of the wider span.

If, however, the 10-foot, 108-degree roof with 1209 pounds horizontal thrust is opposed by a 5-foot, 60-degree roof, at one-half the value of the 60-degree roof of the table, or about 1030 pounds, it is evident that the thrust conditions are approaching each other. Therefore, the reason for the difference in the included angle.

(To be continued)

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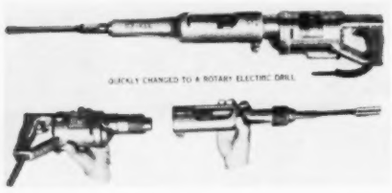
NEW EQUIPMENT

Combination Electric Hammer And Drill—

Wodack Electric Tool Corp., 4627 West Huron street, Chicago, recently brought out a combination electric hammer and drill, shown herewith. The hammer mechanism is so constructed that there are only two working parts. Motor is of the universal type with forced draft ventilation, and the tool may be operated from any light socket. By simply opening the chuck and loosening a cap screw, the hammer member may be removed and the tool used as an electric drill, with a capacity of ⅜ inch in metal. It may also be used as a portable grinder and buffer. When used as a hammer with star drills the tool drills holes in concrete and masonry up to 1⅜ inches diameter, and by using special tools it does chipping, chiseling, cutting and vibrating. The manufacturer sets forth that this combination tool will be found useful by contractors, maintenance departments and installers of equipment using expansion bolts and similar concrete fastenings.



This Wodack electric hammer also can be used as a drill

♦ ♦ ♦

Dead Fuse Indicator—

Littelfuse Laboratories, 4507 Ravenswood avenue, Chicago, recently introduced a device embodying a tiny neon lamp and casing, designed to tell instantly when and where a fuse is blown. The lamp bulb itself is only the size of a pencil tip 1 inch long. It is connected directly in parallel with the fuse and draws no current until the fuse has blown. These new units are adapted for use on any size cartridge fuse, and even plug fuses, since they measure only 1¾ inches long overall x 5/16-inch maximum diameter and have 6-inch connecting leads. They are designed for circuits of 100 to 550 volts alternating current or direct current and light on only 0.0005 ampere current. A protective resistance is built in. Other uses include indicating open circuits, switches, relays, etc.

♦ ♦ ♦

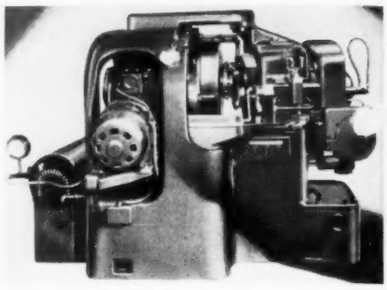
Convected Air Tempering Furnaces—

Despatch Oven Co., 622 Ninth street, S. E., Minneapolis, recently developed a type H, shown herewith, and a type HT convected air tempering furnaces. These new units are heated with gas. This factor, combined with a novel air circulating and recirculating arrangement used in these furnaces, makes additional savings possible. Up to 80 per cent of the air may be recirculated, and exceptionally fine results are assured.

Air is the heating medium used. High capacity patented fan units force the heated air downward on parts being processed with pressure and a high velocity swirling action, penetrating all parts of the furnace and load. Through the use of special baffles, the air travel through the furance is positive, and the result is uniformly treated parts. The circulating system has capacity to provide up to four changes per minute in the working chamber of the furnace.

By scientific application of the mechanical convection principle of heat transfer, not only are uniformly treated products assured, but also the rate of production is increased due to the faster transfer of heat to parts in furnace. These new furnaces are made in all sizes, either batch or conveyor types.

Gas heated Despatch convected air tempering furnace



Gleason machine for finish cutting spiral and hypoid gears

♦ ♦ ♦

Single Cycle Gear Finishing Machine—

Gleason Works, 1000 University avenue, Rochester, N. Y., recently brought out a new machine, shown above, for finish cutting spiral and hypoid gears. Designated No. 11, this unit employs a method that is claimed to be the fastest yet devised. The gear to be finish-cut is previously rough-cut in standard roughers, and then transferred to the new machine for finish cutting.

The face-mill finishing cutter used consists of two series of inserted blades. First there is a series of blades of progressively increasing depths which accurately shape and space the tooth by a succession of light cuts. Then follows a series of finishing blades, each cutting the full depth, which finally size the whole profile of the tooth and produce the desired smooth finish and accuracy of spacing.

Cutter and gear remain in normal full-depth operating position during the entire machine cycle and provision is made for indexing by a gap in the cutter which follows after the second series of blades. When this gap comes abreast of the blank, the blank is indexed. The cutter rotates at a uniform speed. When the cutter revolutions equal the number of teeth in the gear, the gear will be finished.

An automatic stop, which functions

to stop the machine when the last tooth is cut, eliminates any possibility of recutting. The stop resets itself after each gear. A hydraulic unit carrying 600 pounds per square inch pressure supplies power for the hydraulic function. This unit delivers sufficient power to operate more than one machine. It is driven by a separate 2 horsepower 1200 revolutions per minute motor.

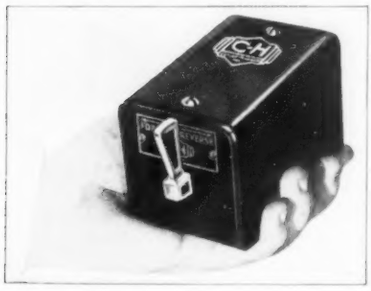
♦ ♦ ♦

Small Drum Switch—

Cutler-Hammer Inc., 320 North Twelfth street, Milwaukee, is announcing a small size drum switch which embodies a simple sturdy mechanism and has a high capacity ..ing. The unit, shown herewith, is designated bulletin 9441, type V1, and is of the across-the-line type, with "twin-break" contacts and molded arc barriers. It can be furnished in either a standard enclosure or as a skeleton drum with mounting plate for "built-in" applications on machines.

All arcing parts are designed to give long wear and to be easily renewed. Movable contacts are easily and quickly removed, without the use of any tools. The stationary contacts are assembled into an inexpensive molded base, so that when they require renewal, the entire base is replaced by simply removing three screws.

The drum switch is applicable to almost any type of single phase, polyphase or direct-current motors. It also can be used as a three pole, double throw switch by removing the jumpers. Ratings are: for single phase, 1 horsepower, 110 volts; 1½ horsepower, 220 volts—for



Small Cutler-Hammer drum type reversing switch

polyphase, 1½ horsepower, 110 volts; 2 horsepower, 220, 440 or 550 volts—for direct-current 1 horse power, 115 or 230 volts. Its nominal eight-hour rating is 15 amperes.

♦ ♦ ♦

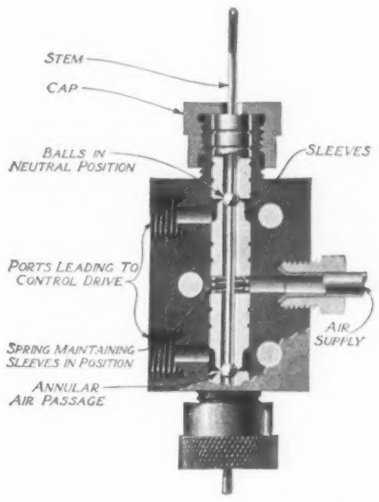
Hand Fire Extinguisher—

Walter Kidde & Co., Inc., 140 Cedar street, New York, recently introduced a hand fire extinguisher recommended for incipient oil and electrical fires. The extinguishing agent, carbon dioxide gas, is harmless to man or material but still is the fastest extinguishing agent known, according to the manufacturer. It is good until used and does not require annual recharging. The model is of rugged construction throughout, weighing but 10¾ pounds and contains 2 pounds of gas. Operation is simplified by a seat type valve which allows discharge to be turned on or off in the same manner as a water faucet.

♦ ♦ ♦

Air-Operated Combustion Control System—

Bailey Meter Co., 1050 Ivanhoe road, Cleveland, has developed a new air-operated combustion control



Bailey free-floating pilot valve

which automatically operates boilers to maintain steam pressure, furnace draft and maximum combustion economy. Demand for steam is measured by variations in steam pressure and the rate of combustion is varied accordingly by the simultaneous control of fuel and air. This simultaneous control of fuel and air alone, however, does not insure the highest combustion economy since the relationship between fan speed or damper position and air supply is not at all consistent and since stoker speed, feeder speed and oil or gas valve position does not hold a definite relation to the fuel supply. In order to overcome this difficulty, the new control system utilizes the steam flow—air flow relation of the Bailey boiler meter to readjust fuel or air supply so as to continuously maintain maximum combustion economy.

The control system is based upon the accurate measurement of all factors involved by the company's standard recorders in which are incorporated frictionless free floating air pilot valves. As will be noted from the accompanying illustration, these pilot valves are constructed so that they in no way decrease the accuracy or limit the operating ranges of the devices by which they are actuated.

♦ ♦ ♦

Chaplet—

Angell Nail & Chaplet Co., 4580 East Seventy-first street, Cleveland, has introduced a chaplet as shown in the accompanying illustration. The

Shank of this Angell chaplet has deeply cut spiral serrations

shank of the chaplet is cut with deep spiral serrations from either end toward the center where they are divided by a narrow strip of metal of slightly wider diameter than the shank. These serrations, it is claimed, make it impossible for the chaplet to turn in the castings, while the center provides a seal against pressure of liquids and gases. It is claimed that a special metal is used in the chaplet which blends and fuses well with the casting. The chaplets are made with round and square heads.

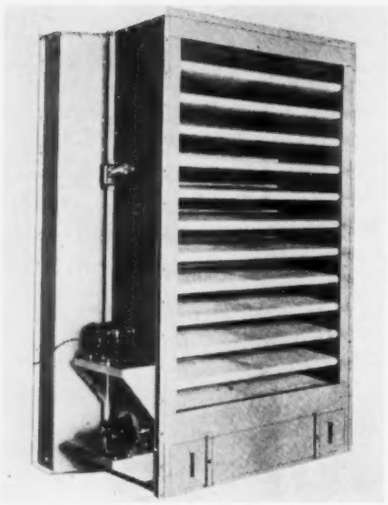
♦ ♦ ♦

Self-Cleaning, Dry-Type Dust Filter—

Coppus Engineering Corp., Worcester, Mass., has introduced a new fully-automatic self cleaning, dry type filter. The unit uses a specially woven cotton fabric as the filter medium. When the air passes through this material, the dust particles are sifted out and deposited on the filter curtain. Periodically, according to dust concentration, the filter is cleaned by being moved over a dust drawer and a rotary beater set in operation. This may be accomplished manually or automatically, as desired.

Soft leather fringes beat the curtain on the clean air side, shaking the dust off into a dust drawer at the bottom. A complete cleaning cycle lasts from 8 to 15 minutes, according to the height of the filter.

Filter elements run in a zig-zag



Coppus dry-type filter is full automatic and self-cleaning

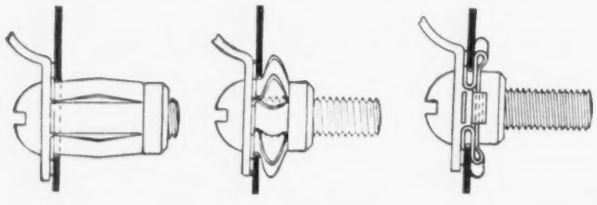
fashion in the shape of an endless belt, over rolls, thus forming horizontal tapered pockets. Both edges of the filter curtain are reinforced by cords to which are attached chains in an endless loop. Sprockets, on which the chains run, are mounted on ends of the rolls. To prevent the by-passing of the uncleaned air, edges of the filter curtain pass through a labyrinth seal, formed between interlocking tapered side plates which extend into the filter pockets on the air intake side, and into corresponding pockets on the clean air side.

• • •

Crimp Nut—

Diamond Expansion Bolt Co., Garwood, N. J., is marketing a crimp nut that meets the need for a secure means of attachment which may be quickly placed into position on a partially or wholly completed sheet metal structure, even though the back or interior is not readily accessible. It may be employed in a hollow section where space is closely confined.

Having access to only the face of the structure, a hole is drilled or punched at the desired location. The hole should be of sufficient diameter to clear the threaded portion. When the nut is inserted the slight bulge compresses to permit it to enter the hole freely. The work then is placed in position and a screw or bolt turned in and tightened up. When fastening is complete the crimp nut is crimped tightly to the metal and will not turn when the screw is entered or removed. The accompanying illustration shows the steps carried out in installation.



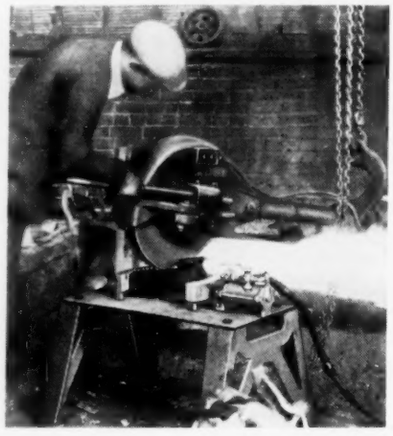
This shows the three steps in the application of the Diamond crimp nut

• • •

Unit Holds Castings for Grinding and Chipping—

Sullivan Machinery Co., Chicago, recently developed a snagging grip, shown herewith, for holding casting for grinding and chipping. It consists of a base plate, with legs optional, and has an adjustable back stop and an air-operated jaw. The unit clamps practically any shape of casting from 2 inches to 20 inches. It opens instantly to release the piece, but closes slowly, safeguarding the operator's fingers. The dog and jaw may be faced with wood to protect the surfaces of the softer metals.

The device permits the use of



Sullivan unit holds castings for grinding and chipping

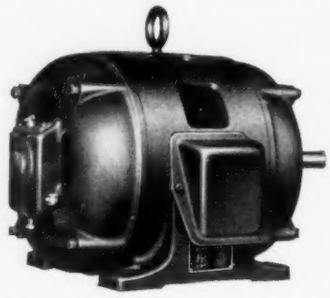
swing frame grinders. Overall height of the complete unit is 23½ inches, the spread of jaw, 7¾-inches, and the weight complete 150 pounds.

• • •

Squirrel Cage Induction Polyphase Motor—

Century Electric Co., 1806 Pine street, St. Louis, has announced a new line of squirrel cage normal torque and high torque motors. Special attention has been given to mechanical stability. Construction includes cast frame and end brackets, ample sized shafts and bearings and well anchored field and rotor cores.

Corresponding electrical ruggedness is provided through the use of the latest offerings of the wire drawing industry, including electrolytic



Century squirrel cage induction polyphase motor

copper bars and end rings so joined as to form an homogeneous high conducting joint. These motors, one of which is shown herewith, are available in sleeve or ball bearing designs as required and are available in sizes 600 horsepower and smaller.

• • •

Loader—

Barber-Greene Co., Aurora, Ill., has introduced a new loader featuring a tank-type chassis frame. Synchronized feeding is secured through a special arrangement of the spiral feeding screws, thus increasing the capacity.

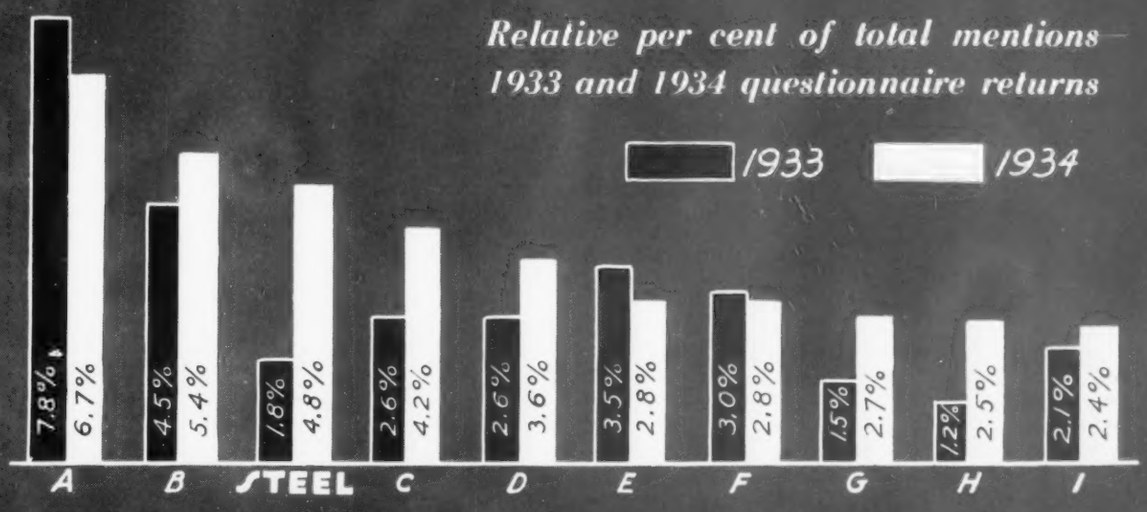
A new parallelogram axle is employed to keep the two crawlers parallel. The unit includes a special floating boom principle, which lets

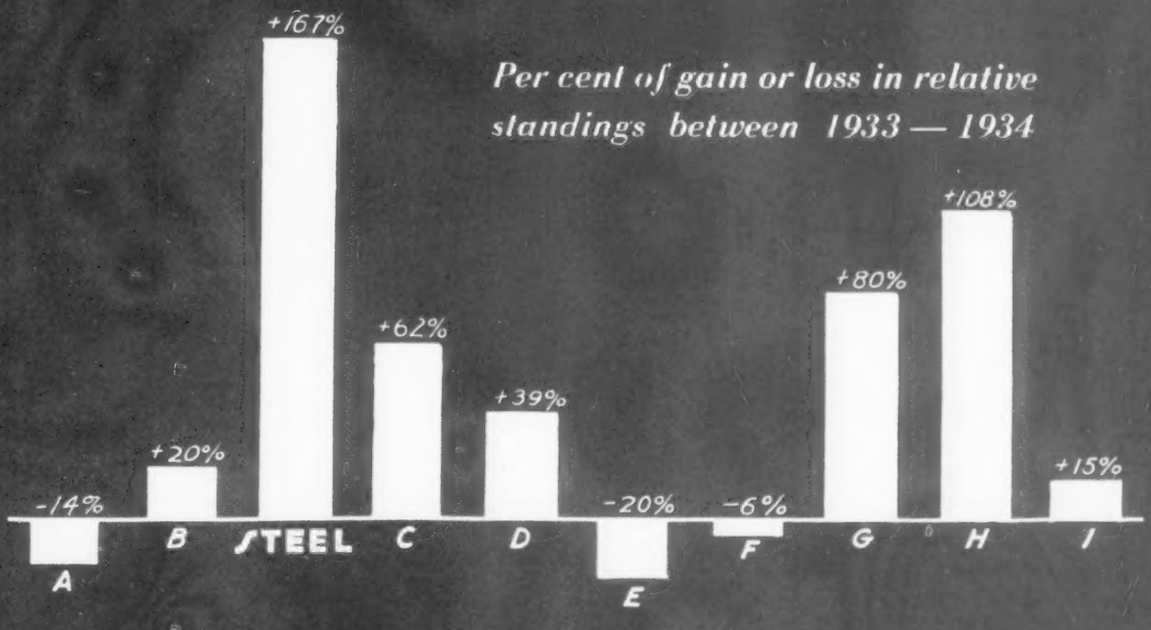
Barber-Greene loader incorporates synchronized feeding arrangement

the crowding thrust go direct from the crawlers to the feeding end, and not through the main frame. A special automatic overload release sprocket protects the machine from overload. A view of the machine is shown herewith.

Number 3 of a series

Comparative results of two reader surveys of publications made by another mechanical rubber goods manufacturer





Charted above are the ten publications (both general and industrial) receiving the greatest number of mentions in the 1934 survey. As indicated, STEEL received 4.8% of all the mentions in 1934, the highest percentage of any industrial publication.

Just another proof that STEEL is the *fastest growing Industrial Publication*

New Trade Publications

WELDING EQUIPMENT — Torchweld Equipment Co., 1035 West Lake street, Chicago, has issued catalog No. 35 of its nonflash gas welding and cutting equipment.

DROP FORGINGS—Kropp Forge Co., 5301 West Roosevelt road, Chicago, is distributing a folder calling attention to its facilities for production of drop forgings of quality.

WIRE CLOTH—Newark Wire Cloth Co., 351 Verona avenue, Newark, N. J., has published a folder containing data on typical weaves and meshes of wire cloth, sieves, filter cloth and strainers.

CRANE WHEELS—American Manganese Steel Co., 389 East Fourteenth street, Chicago Heights, Ill., has issued a bulletin and dimension sheet on its double-wall crane track wheels.

COMPARATORS—Jones & Lamson Machine Co., Springfield, Vt., has issued a catalog on its comparators, in several types, with illustrations, descriptions and specifications.

SAFETY SIGNS—Mine Safety Appliance Co., Pittsburgh, is distributing a folder showing in colors its line of steel and enamel signs for marking danger points in mines and industrial plants.

AIR FILTER—Coppus Engineering Corp., Worcester, Mass., in bulletin No. F-350-1 describes its fully automatic, self-cleaning air filter, with diagrams and discussion of problems of air purification.

MUFFLE FURNACES — Hevi Duty Electric Co., Milwaukee, has issued bulletin No. HD 535 on its standard line of muffle furnaces for heat treating, experimental test work, enameling and other uses. It is well illustrated.

TURRET LATHE—Warner & Swasey Co., Cleveland, in its circular No. 3501 presents its No. 4 universal turret lathe with 12-speed, all-geared head. It is profusely illustrated to show details of construction and operation.

WEAR RESISTANCE — Meehanite Metal Corp., Pittsburgh, has published bulletin No. 4 of the Meehanite Research institute, devoted to wear resistance. A chart shows comparisons of various materials and illustrations picture the resulting wear .

BURNERS — Surface Combustion Corp., Toledo, O., has issued bulletin No. SC67 on its standard burners and burner equipment, with discussion of combustion principles and illustrations showing installations in a wide variety of uses.

POWER TRANSMISSION—Graton & Knight Co., Worcester, Mass., has issued a publication devoted to a study of application of power to the work. Figures and facts brought out in the survey are supplemented by drawings and other illustrative material.

STEEL—Ludlum Steel Co., Watervliet, N. Y., in a current leaflet traces its history back to 1750 and shows progressive development as metallurgy has improved until its product now is at the front in quality and wide distribution.

AIR CONDITIONING—Leeds & Northrup Co., 4934 Stenton avenue, Philadelphia, has issued a booklet on efficient regulation of an air-conditioning system. It is prepared for the owner, architect, engineer and contractor and provides what each needs to know about electrical thermometers.

LIFTING MAGNETS—Ohio Electric Mfg. Co., 5900 Maurice avenue, Cleveland, in bulletin No. 109 features its line of lifting magnets, with illustrations of various uses to which they are being put in industry and elsewhere. Diagrams are included to show construction and special features.

POLYPHASE MOTORS — Century Electric Co., 1806 Pine street, St. Louis, in a current bulletin describes its line of squirrel-cage induction polyphase motors, from 1/6 to 600 horsepower, designed especially to meet the exacting requirements of air-conditioning installations.

STEEL SPECIFICATIONS—Timken Steel & Tube Co., Canton, O., has issued a specification sheet covering types of steel, containing alloy and carbon steels under S.A.E. classifications and special corrosion and heat-resisting steels produced by the Timken company.

PYROMETERS — Illinois Testing Laboratories Inc., 141 West Austin avenue, Chicago, has issued its bulletin No. 2129 in which is described its new horizontal edgewise pyrometer, with or without multi-point switch, the latter giving choice of 8, 17, 18 or 25 points.

BEARING APPLIANCES—Bearing Appliance Co., Ardmore, Pa., has issued its bulletin B on standard appliances for antifriction bearing mountings. After general discussion of the application of these appliances the bulletin presents complete data tables and drawings.

FORGINGS—A. Finkl & Sons Co., 2011 Southport avenue, Chicago, has issued a catalog of molybdenum-chrome-nickel steel heavy-duty forgings in which the subject of forging is discussed fully and advantages of forgings are described. Charts and tables of physical properties are included.

OIL BURNER—R-S Products Corp., Germantown avenue, Philadelphia, in a current bulletin describes its DI automatic oil burner for industrial use. It is self-contained, requiring only connection to the oil supply and electric current. It is applicable to core ovens, salt baths, annealing furnaces, lead pots, ladle heating and similar uses.

PACKAGING—Gerrard Co. Inc., 2915 West Forty-seventh street, Chicago, has issued a new bulletin describing its metal binding machines and their applications. These include, in addition to wire tying both small and large packages and boxes for shipment, the binding of loose products, such as steel sheets and pipe, machine parts, etc., for carload storage.

BALL BEARINGS—New Departure Mfg. Co., Bristol, Conn., has issued the tenth edition of its catalog of ball bearings, containing listing of new bearing types and new sizes of existing types, tolerances and mount ng fits for standard, precision and ultra precision bearings, bearing closure data and approved methods of bearing selection.

HIGH-TEMPERATURE MORTARS —Harbison-Walker Refractories Co., Farmers Bank building, Pittsburgh, has prepared folders on three types of its high-temperature bonding mortars, Thermolith, Firebond and Harwaco bond. Each contains a list of applications for which each mortar is best suited.

RECOVERY STILLS — Barnstead Still & Sterilizer Co. Inc., 2 Lanesville terrace, Forest Hills, Boston, is distributing a folder on its solvent recovery stills for industrial use in reclaiming materials used in processing. Typical uses of the stills are listed and illustrations show characteristic installations.

ROLLING MILLS AND PRESSES — Schloemann Engineering Co., Dusseldorf, Germany, whose office in the United States is in the Empire building, Pittsburgh, has issued a catalog on its rolling mills and one on its hydraulic presses, well illustrated to show construction and with views of typical installations.

PNEUMATIC TOOLS—Independent Pneumatic Tool Co., 600 West Jackson boulevard, Chicago, in its catalog No. 50 shows its entire line of pneumatic tools. Illustrations and specifications are furnished for each tool. In addition a general showing is made of electric tools, high frequency electric tools and mining tools.

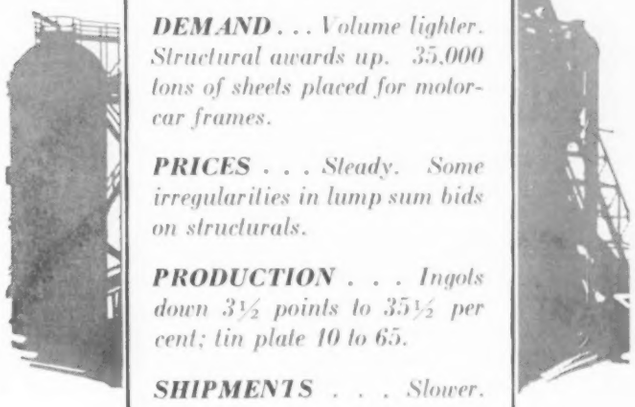
COMPRESSORS AND PUMPS—Ingersoll-Rand Co., Phillipsburg, N. J., has issued catalog No. 7502-D on its type 30 industrial compressors and vacuum pumps from ¼ to 15 horsepower. Included are compressors of single stage, single and twin cylinder and two stage types, with vertical or horizontal receivers, driven by electric motor, gasoline engine or belt.

COSTS AND PROFITS—National Industrial Conference Board Inc., 247 Park avenue, New York, in its study No. 213 treats of costs and profits in manufacturing industries from 1914 to 1933, to aid in consideration of many current questions of public policy involving ability of private manufacturing enterprise to adjust to additional burdens imposed by government.

STAMPINGS—A booklet on stampings has been prepared by Geuder, Paeschke & Frey Co., West St. Paul avenue and North Fifteenth street, Milwaukee, covering their place in present day design, manufacturing and selling. It treats possibilities of stampings as a solution for the basic sales problems of beauty, quality and price. Some solutions are presented in illustrations.

Large Sheet, Shape Orders in Quieter Market

35,000 Tons Placed for Chevrolet; 33,000 Tons Structurals; Rate, 35½



MARKET IN TABLOID

DEMAND . . . *Volume lighter. Structural awards up. 35,000 tons of sheets placed for motorcar frames.*

PRICES . . . *Steady. Some irregularities in lump sum bids on structurals.*

PRODUCTION . . . *Ingots down 3½ points to 35½ per cent; tin plate 10 to 65.*

SHIPMENTS . . . *Slower.*

A SHARP reduction in demand for the majority of finished steel products last week was offset to some extent by a substantial increase in structural shape awards, 32,891 tons, largest since March, and purchase of 35,000 tons of sheets for Chevrolet car frames.

The net result was a decline of 3½ points to 35½ per cent in steelworks operations, but notwithstanding this, sentiment in the market continues moderately strong. While a further reduction is anticipated by leading steelmakers, the transition from June to July apparently will not be accompanied by any such precipitate drop as developed last year when the rate fell from 53 to 26 per cent.

Automobile assemblies last week, 90,000, were only a few hundred units less than in the preceding week, and the appearance of material specifications from partsmakers for fall models leads steelmakers to believe the plan to eliminate the midsummer slump in the motorcar industry will be at least partially successful.

The government has ascertained in connection with its public works program that an average of 84 man-hours of labor—from extracting raw materials to erecting finished product—is involved in one gross ton of structural shapes, a high labor factor which should tend to expedite action on many projects. Its awards last week included 9000 tons for an addition to Library of Congress. Bids will be taken July 16 on 20,000 tons for a department of the interior building, Washington.

Chesapeake & Ohio this week has scheduled the award of 5125 freight cars, requiring 65,000 tons of steel. A PWA loan has been granted to Norfolk Southern to build 500 steel box cars, and Missouri Pacific has been granted court permission to buy 10,000 tons of rails. Wabash is taking bids on 5000 tons of rails; Grand Trunk Western on 150 gondola cars. Inquiries are active for river barges and towboats which will require 8600 tons of plates.

With few exceptions prices are stable, and there is little pressure against them except in construction work, where lump sum bids permit considerable flexibility. On plates for the Pennsylvania railroad and substantial tonnages of steel for automobile manufacturers full market prices have been quoted. On a tonnage of plates for the Philadelphia navy yard, however, a bid $2 a ton under the market was submitted, but withdrawn.

A Chicago district mill has named prices on enameling sheets on a Gary, Ind., base, $2 a ton over the Pittsburgh base, in line with other grades of sheets there. Although the prices were filed with the Steel institute, as under the code, this was considered exceptional, and not likely to be generally followed.

Labor legislation, passed and pending, at Washington, has far less disturbing influence on the markets than would have been true before the Supreme Court's NRA decision. The effect of the Wagner bill's passage is minimized by doubts as to its constitutionality. The majority of steel producers now have pension plans, and so are exempt from the social securities legislation. The proposed tax program means an increase of 22 per cent for most steelmakers, as they fall in the higher bracket, but the proposal for the use of taxing power against corporate surpluses appears too indefinite at this time to be of any immediate market significance.

Detroit steelworks operations last week declined 24 points to 70 per cent; Pittsburgh 2 to 30; Chicago 2 to 39; Cleveland 3 to 48; Buffalo 3 to 32; eastern Pennsylvania 1 to 29; New England 4 to 56; Birmingham ½-point to 30; Youngstown 1 to 41. Wheeling was unchanged at 48 per cent.

STEEL's iron and steel price composite is down 1 cent to $32.40; the finished steel index holds at $54, while the scrap composite is off 8 cents to $10.38.

COMPOSITE MARKET AVERAGES

	June 22	June 15	June 8	One Month Ago May, 1935	Three Months Ago March, 1935	One Year Ago June, 1934	Five Years Ago June, 1930
Iron and Steel	$32.40	$32.41	$32.45	$32.35	$32.26	$32.96	$33.28
Finished Steel	54.00	54.00	54.00	54.00	54.00	55.08	52.37
Steelworks Scrap	10.38	10.46	10.58	10.27	10.75	10.32	13.11

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

A COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	June 22, 1935	May, 1935	Mar., 1935	June, 1934
Steel bars, Pittsburgh	1.80c	1.80c	1.80c	1.90c
Steel bars, Chicago	1.85	1.85	1.85	1.95
Steel bars, Philadelphia	2.11	2.11	2.09	2.19
Iron bars, Terre Haute, Ind	1.75	1.75	1.75	1.85
Shapes, Pittsburgh	1.80	1.80	1.80	1.85
Shapes, Philadelphia	2.01½	2.01½	2.00½	2.05½
Shapes, Chicago	1.85	1.85	1.85	1.90
Tank plates, Pittsburgh	1.80	1.80	1.80	1.85
Tank plates, Philadelphia	2.00	1.99	1.98½	2.03½
Tank plates, Chicago	1.85	1.85	1.85	1.90
Sheets, No. 10, hot rolled, Pitts.	1.85	1.85	1.85	2.00
Sheets, No. 24, hot ann., Pitts.	2.40	2.40	2.40	2.65
Sheets, No. 24, galvan., Pitts.	3.10	3.10	3.10	3.25
Sheets, No. 10, hot rolled, Gary	1.95	1.95	1.95	2.10
Sheets, No. 24, hot anneal., Gary	2.55	2.55	2.55	2.75
Sheets, No. 24, galvan., Gary	3.20	3.20	3.20	3.35
Plain wire, Pittsburgh	2.30	2.30	2.30	2.30
Tin plate, per base box, Pitts.	5.25	5.25	5.25	5.25
Wire nails, Pittsburgh	2.60	2.60	2.60	2.60

Semifinished Material

Sheet bars, open-hearth, Youngs.	$28.00	$28.00	$28.00	$30.00
Sheet bars, open-hearth, Pitts.	28.00	28.00	28.00	30.00
Billets, open-hearth, Pittsburgh	27.00	27.00	27.00	29.00
Wire rods, Pittsburgh	38.00	38.00	38.00	38.00

Pig Iron

	June 22, 1935	May, 1935	Mar., 1935	June, 1934
Bessemer, del. Pittsburgh	$19.81	$19.80	$19.76	$19.76
Basic, Valley	18.00	18.00	18.00	18.00
Basic, eastern, del. eastern Pa.	19.76	19.81	19.76	19.76
No. 2, foundry, del. Pittsburgh	19.31	19.30	19.26	19.26
No. 2, foundry, Chicago	18.50	18.50	18.50	18.50
Southern No. 2, Birmingham	14.50	14.50	14.50	14.50
No. 2X eastern, del. Philadelphia	20.68	20.68	20.63	20.63
Malleable, Valley	18.50	18.50	18.50	18.50
Malleable, Chicago	18.50	18.50	18.50	18.50
Lake Superior charcoal, del. Chi.	24.25	24.25	24.04	24.04
Ferromanganese, del. Pittsburgh	90.13	90.13	89.79	90.00
Gray forge, del. Pittsburgh	18.67	18.66	18.63	18.88

Scrap

Heavy melting steel, Pittsburgh	$12.00	$12.00	$12.40	$11.90
Heavy melt. steel, No. 2, east. Pa.	9.25	9.25	9.15	8.95
Heavy melting steel, Chicago	10.25	10.20	10.45	9.75
Rails for rolling, Chicago	11.25	11.05	11.55	11.25
Railroad steel specialties, Chicago	11.75	11.40	11.55	11.25

Coke

Connellsville, furnace, ovens	$3.40	$3.60	$3.60	$3.60
Connellsville, foundry ovens	4.60	4.60	4.60	4.60
Chicago, by-product foundry, del.	9.25	9.25	9.25	9.25

Steel, Iron, Raw Material, Fuel and Metals Prices

Except when otherwise designated, prices are base, f.o.b. cars. Asterisk denotes price change this week.

Sheet Steel

Hot Rolled No. 10, 24-48 in.

Pittsburgh	1.85c
Gary	1.95c
Chicago, delivered	1.98c
New York, del.	2.20c
Philadelphia, del.	2.16c
Birmingham	2.00c
St. Louis, del.	2.17c
Pacific ports, f.o.b. cars, dock	2.40c

Hot Rolled Annealed No. 24

Pittsburgh	2.40c
Gary	2.50c
Chicago, delivered	2.53c
Detroit, delivered	2.60c
New York, del.	2.75c
Philadelphia, del.	2.71c
Birmingham	2.55c
St. Louis, del.	2.72c
Pacific ports, f.o.b. cars, dock	3.05c

Galvanized No. 24

Pittsburgh	3.10c
Gary	3.20c
Chicago, delivered	3.23c
Philadelphia, del	3.41c
New York, del.	3.45c
Birmingham	3.25c
St. Louis, del.	3.42c
Pacific ports, f.o.b. cars, dock	3.70c

Tin Mill Black No. 28

Pittsburgh	2.75c
Gary	2.85c
St. Louis, delivered	3.07c

Cold Rolled No. 10

Pittsburgh	2.50c
Gary	2.60c
Detroit, delivered	2.70c
Philadelphia, del.	2.81c
New York, del.	2.85c
Pacific ports, f.o.b. cars, dock	3.10c

Cold Rolled No. 20

Pittsburgh	2.95c
Gary	3.05c
Detroit, delivered	3.15c
Philadelphia, del.	3.26c
New York, del.	3.30c

Enameling Sheets

Pittsburgh, No. 10	2.50c
Pittsburgh, No. 20	3.10c
Gary, No. 10	2.60c
Gary, No. 20	3.20c

Tin and Terne Plate

Gary base, 10 cents higher.

Tin plate, coke base con. (box) Pitts.	$5.25
Do., waste-waste	2.75c
Do., strips	2.50c
Long ternes, No. 24 unassorted, Pitts.	3.40c
Do., Gary	3.50c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No 304
Bars	23.00	24.00
Plates	26.00	28.00
Sheets	33.00	35.00
Hot strip	20.75	22.75
Cold strip	27.00	29.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	17.00	18.50	21.00	26.00
Plates	20.00	21.50	24.00	29.00
Sheets	25.00	28.00	31.00	35.00
Hot strip	15.75	16.75	21.75	26.75
Cold stp.	20.50	22.00	27.00	35.00

Steel Plates

Pittsburgh	1.80c
New York, del.	2.09c
Philadelphia, del.	1.99c
Boston, delivered	2.22c
Buffalo, delivered	2.05c
Chicago or Gary	1.85c
Cleveland, del.	1.99½c
Birmingham	1.95c
Coatesville, base	1.90c
Sparrows Pt., base	1.90c
Pacific ports, f.o.b. cars, dock	2.35c
St. Louis, delivered	2.07c

Structural Shapes

Pittsburgh	1.80c
Philadelphia, del.	2.01½c
New York, del.	2.06½c
Boston, delivered	2.20½c
Bethlehem	1.90c
Chicago	1.85c
Cleveland, del.	2.00c
Buffalo	1.90c
Gulf Ports	2.20c
Birmingham	1.95c
Pacific ports, f.o.b. cars, dock	2.35c

Bars

Soft Steel

Pittsburgh	1.80c
Chicago or Gary	1.85c
Duluth	1.95c
Birmingham	1.95c
Cleveland	1.85c
Buffalo	1.90c
Detroit, delivered	1.95c
Pacific ports, f.o.b. cars, dock	2.35c
Philadelphia, del.	2.11c
Boston, delivered	2.22c
New York, del.	2.15c
Pitts., forg. qual.	1.95c-2.05c

Rail Steel

To Manufacturing Trade

Pittsburgh	1.70c
Chicago or Gary	1.75c
Moline, Ill.	1.75c
Cleveland	1.75c
Buffalo	1.80c

Iron

Troy, N. Y.	1.70c
Terre Haute, Ind.	1.75c
Chicago	1.80c
Philadelphia	1.91c
Pittsburgh, refined	2.75-7.50c

Reinforcing

New billet, straight lengths, quoted by distributors.

Pittsburgh	2.05c
Chicago, Gary, Buffalo, Cleve., Birm., Young.	2.10c
Gulf ports	2.45c
Pacific coast ports f.o.b. cars dock	2.45c
Philadelphia, del.	2.36c

Rail Steel

Straight lengths quoted by distributors

Pittsburgh	1.90c
Chicago, Buffalo, Cleveland, Birm., Young.	1.95c
Gulf ports	2.30c

Wire Products

(Prices apply to straight or mixed carloads; pool cars, or less, 15c up. 10% dis. on nail extras on stright or mixed carloads to one consignee.)

Base Pitts.-Cleve. 100 lb. keg.

Standard wire nails	$2.60
Cement coated nails	2.60
Galvanized nails, 15 gage and coarser	4.60c
do., 16 gage and finer	5.10c

(Per pound)

Polished staples	3.30c
Galvanized fence staples	3.55c
Barbed wire, galv.	3.00c
Annealed fence wire	2.45c
Galvanized fence wire	2.80c
Woven wire fencing (base column, c.l.)	$63.00
Plain wire, 6-9 gage to mfg. trade	2.30c

Anderson, Ind., (merchant products only) and Chicago up $1; Duluth up $2; Birmingham up $3.

Spring wire, Pittsburgh or Cleveland	2.90c

Do., Chicago up $1, Worcester, $2.

Cold-Finished Carbon Bars and Shafting

Base Pitts., one size, shape, grade, shipment at one time to one destination

10,000 to 19,999 lbs	1.95c
20,000 to 59,999 lbs.	1.90c
60,000 to 99,999 lbs.	1.85c
100,000 lbs. and over	1.82½c

Gary, Ind., Cleveland, up 5c; Buffalo, up 10c; Detroit, up 20c; eastern Michigan, up 25c.

Alloy Steel Bars (Hot)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem	2.45c

Alloy S.A.E.	Diff.	Alloy S.A.E.	Diff.
2000	0.25	3100	0.55
2100	0.55	3200	1.35
2300	1.50	3300	3.80
2500	2.25	3400	3.20

4100 0.15 to 0.25 Mo. 0.50
4600 0.20 to 0.30 Mo. 1.25-1.75 Ni. 1.05
5100 0.80-1.10 Cr. 0.45
5100 Cr. spring base
6100 bars 1.20
6100 spring 0.70
Cr., Ni., Van. 1.50
Carbon Van. 0.95
9250 Carbon base plus extras

Piling

Pittsburgh	2.15c
Chicago, Buffalo	2.25c

Strip and Hoops

Hot strip to 23/4-in.

Pittsburgh	1.85c
Chicago, base	1.95c
Birmingham base	2.00c
Detroit, delivered	2.05c
Philadelphia, del.	2.16c
New York, del.	2.20c
Cooperage hoop, Pittsburgh	1.95c
Chicago	2.05c
Cold-rolled strip, Pitts., Cleve.	2.60c
Worcester, Mass.	2.80c

Rails, Track Material

(Gross Tons)

Standard rails, mill	$36.37½
Relay rails, Pitts.	
24-45 lbs.	$26.00
50-60 lbs.	$23.00
70-75 lbs.	$20.00
80-85 lbs.	$24.00
100 lbs.	$25.00
Light rails, billet qual. Pitts., Chi.	$35.00
Do., reroll. qual.	34.00
Angle bars, billet, Gary, Ind., So. Chi.	2.55c
Do., axle steel	2.10c
Spikes, R. R. base	2.40c
Track bolts, base	3.55c
Tie plates, base	1.90c

Base, light rails 25 to 40 lbs.; 50 to 60 lbs. inclusive up $5; 16 and 20 lbs., up $1; 12 lbs. up $8; 8 and 10 lbs., up $5. Base railroad spikes 200 kegs or more; base tie plates 20 tons.

Bolts and Nuts

Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate trade for all case lots, Dec. 1, 1932, lists, 10% extra for less full containers.

Carriage Bolts

All sizes, cut thread	70-10-5 off
Rolled thread, ½ x 6, smaller	70-10-5 off

Machine Bolts

All sizes cut thread lag screws, plow bolts, Nos. 1-2-3-7 heads, tap bolts, blank bolts stud bolts	70-10-5 off
Tire bolts	60-5 off
Stove bolts, 75 off in pkgs.; 83 off on 15,000 of 3-inch and shorter, or 5000 over 3-inch.	
Rolled thread machine, ½ x 6, smaller	70-10-5 off
Step bolts	70-5 off
Elevator bolts	70-5 off

Nuts

S.A.E. semifinished hex.; ½ to 7/8-inch	70-10-5 off
Do., ½ to 1-inch	70-10-5 off
Do., over 1-inch	70 off

Hexagon Cap Screws

Milled	85-10 off
Upset, 1-in., smaller	87½ off

Square Head Set Screws

Upset, 1-in., smaller	80 off
Headless set screws	75 off

Rivets, Wrought Washers

Struc., c. l., Pittsburgh, Cleveland.	2.90c
Struc., c. l., Chicago	3.00c
7/8-in. and smaller, Pitts., Chi., Cleve.	70 and 5 off
Wrought washers, Pitts., Chi., Phila., to jobbers & large nut, bolt mfrs.	$6.25 off

Cut Nails

Cut nails, Pitts.; (10% discount on size extras)	$2.75
Do. less carloads, 5 kegs or more no discount on size extras	$3.05
Do. under 5 kegs; no discount on size extras	$3.20

Pipe and Tubing

Base $200 net ton, except on standard commercial seamless boiler tubes under 2 inches and cold drawn seamless tubing.

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less. Chicago delivered 2½ points less. Wrought pipe, Pittsburgh base.

Butt Weld

In.	Blk.	Gal.
Steel		
¼ and ⅜	53½	35
½	58½	47
¾	62	52
1—3	64	55
Iron		
½	31½	15
¾	36½	20½
1—1¼	39½	25½
2	41½	26

Lap Weld

Steel		
2	60	51
2½—3	63	54
3½—6	65	56
7 and 8	64	54
9 and 10	63½	53½
Iron		
2	37	22½
2½—3½	38	25
4—8	40	28½

Line Pipe

Steel	
½, butt weld	57½
⅛-inch, butt weld	50½
¼—⅜, butt weld	52½
¾, butt weld	61
1—3, butt weld	63
2-inch, lap weld	59
2½—3, lap weld	62
3½—6, lap weld	64
7—8, lap weld	63
Iron	

⅛—1½ inch, black and galv. take 4 pts. over; 2½—6 inch 2 pts. over discounts for same sizes, standard pipe lists, 8—12-inch, no extra.

Boiler Tubes

C. L. Discounts, f.o.b. Pitts.

Lap Weld Steel		*Charcoal Iron*	
2—2¼	33	1¾	8
2½—2¾	40	2—2¼	13
3	47	2½—2¾	16
3¼—3½	50	3	17
4	52	3¼—3½	18
4½—5	42	4	20
		4½	21

In lots of a carload or more, above discounts subject to preferential of two 5% and one 7½% discount on steel and 10% on charcoal iron.

Lapwelded steel: 200 to 9999 pounds, ten points under base, one 5% and one 7½%. Under 2000 pounds 15 points under base, one 5% and one 7½%. Charcoal iron: 10,000 pounds to carloads, base less 5%; under 10,000 lbs., 2 points under base.

Seamless Boiler Tubes

Under date of May 15 in lots of 40,000 pounds or more for cold-drawn boiler tubes and in lots of 40,000 pounds or feet or more for hot-finished boiler tubes, revised prices are quoted for 55 cold-drawn boiler tube sizes ranging from ¼ to 6-inch outside diameter in 30 wall thicknesses, decimal equivalent from 0.035 to 1.000, on a dollars and cents basis per 100 feet and per pound.

Hot-finished carbon steel boiler tube prices also under date of May 15 range from 1 through 7 inches outside diameter, inclusive, and embrace 47 size classifications in 22 decimal wall thicknesses ranging from 0.109 to 1.000, prices also being on a lb. and 100 ft. basis.

Seamless Tubing

Cold drawn; f.o.b. mill disc.

100 ft. or 150 lbs.	32%
15,000 ft. or 22,500 lbs.	70%

Cast Iron Water Pipe

Class B Pipe—Per Net Ton

6-in. & over, Birm.	$39.00-40.00
4-in., Birmingham	42.00-43.00
4-in., Chicago	50.40-51.40
6 to 24-in. Chicago	47.40-48.40
6-in. & over, east fdy.	43.00
Do., 4-in.	46.00

Class A pipe $3 over Class B.

Stnd. fitgs., Birm. base	$100.00

Semifinished Steel

Billets and Blooms

4 x 4-inch base; gross ton

Pitts., Chi., Cleve., and Youngstown	$27.00
Philadelphia	32.67
Duluth	31.00
Forging, Pitts., Chi. and Buffalo	32.00
Forging, Duluth	36.00

Sheet Bars

Pitts., Cleve., Young., Chi., Buff., Canton, Sparrows Pt.	28.00

Slabs

Pitts., Cleve., Young.	27.00

Wire Rods

(Common; combination up $2)

Pitts., Cleveland	38.00
Chicago	39.00
Worcester, Mass.	40.00

Skelp

Pitts., Chi., Young., Buff., Coatesville, Sparrows Point	1.70c

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$3.40- 3.60
Connellsville, fdry.	4.60
Connel. prem. fdry.	5.10- 5.35
New River fdry.	6.00
*Wise county fdry.	4.45- 5.00
Wise county fur.	4.00- 4.50

By-Product Foundry

Newark, N. J., del.	9.20- 9.65
Chi., ov., outside del.	8.50
Chicago, del.	9.25
New England, del.	11.00
St. Louis, del.	9.25
Birmingham, ovens	6.00
Indianapolis, del.	8.75
Cincinnati, del.	9.30
Cleveland, del.	9.25
Buffalo, ovens	7.50- 8.00
Detroit ov., out. del.	8.50
Philadelphia, del.	9.03

Coke By-Products

Per gallon, producers' plants.

	Tank lots	Spot
Pure and 90% benzol		15.00c
Toluol		30.00c
Solvent naphtha		30.00c
Commercial xylol		30.00c

Per lb. f.o.b. New York.

Phenol (200 lb. drums)	16.30c
Do. (100 lbs.)	17.30c

Eastern Plants, per lb.

Naphthalene flakes and balls, in bbls., to jobbers	4.50c

Per 100 lb. Atlantic seaboard

Sulphate of ammonia	$1.20

†Western prices, ½-cent up.

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25; 50c diff. for each 0.25 below 1.75. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$19.50	$20.00	$19.00	$20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Birmingham, Ala., southern del.	14.50	14.50	13.50	19.00
Buffalo	18.50	19.00	17.50	19.50
Chicago	18.50	18.50	18.00	19.00
Cleveland	18.50	18.50	18.00	19.00
Detroit	18.50	18.50	18.00	19.00
Duluth	19.00	19.00	.....	19.50
Erie, Pa.	18.50	19.00	18.00	19.50
Everett, Mass.	19.50	20.00	19.00	20.50
Hamilton, O.	18.50	18.50	18.00	19.00
Jackson, O.	20.25	20.25	19.75	.....
Neville Island, Pa.	18.50	18.50	18.00	19.00
Provo, Utah	17.50	.....	17.00	.....
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Sparrows Point, Md.	19.50	.....	19.00	.....
Swedeland, Pa.	19.50	20.00	19.00	20.50
Toledo, O.	18.50	18.50	18.00	19.00
Youngstown, O.	18.50	18.50	18.00	19.00
Delivered from Basing Points:				
Akron, O., from Cleveland	19.76	19.76	19.26	20.26
Baltimore from Birmingham	20.08	.....	18.96	.....
Boston from Birmingham	19.62	.....	19.50	.....
Boston from Everett, Mass.	20.00	20.50	19.50	21.00
Boston from Buffalo	20.00	20.50	19.50	21.00
Brooklyn, N. Y., from Bethlehem	21.93	22.43	.....	.....
Brooklyn, N. Y., from Bmghm.	21.55	.....	.....	.....
Canton, O., from Cleveland	19.76	19.76	19.26	20.26
Chicago from Birmingham	†18.72	.....	18.60	.....
Cincinnati from Hamilton, O.	19.51	19.51	19.01	.....
Cincinnati from Birmingham	19.38	.....	19.40	.....
Cleveland from Birmingham	19.04	.....	18.92	.....
Indianapolis from Hamilton, O.	20.93	20.93	20.43	21.43
Mansfield, O., from Toledo, O.	20.26	20.26	19.76	20.76
Milwaukee from Chicago	19.57	19.57	19.07	20.07
Muskegon, Mich., from Chicago, Toledo or Detroit	21.60	21.60	21.10	22.10
Newark, N. J., from Birmingham	20.61	.....	.....	.....
Newark, N. J., from Bethlehem	20.99	21.49	.....	.....
Philadelphia from Birmingham	19.93	.....	19.1	.....
Philadelphia from Swedeland, Pa.	20.31	20.81	19.81	.....
Pittsburgh district from Neville Island	Neville base plus 67c, 81c and $1.21 switching charges			
Saginaw, Mich., from Detroit	20.75	20.75	20.25	20.25

Delivered from Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
St. Louis, northern	19.00	19.00	18.50	.....
St. Louis from Birmingham	†18.62	.....	18.50	.....
St. Paul from Duluth	20.94	20.94	.....	21.44

†Over 0.70 phos.

Low Phos

Basing Points: Birdsboro and Steelton, Pa., and Standish, N. Y., $23.50. Phila. base, standard and copper bearing, $24.63

Gray Forge		Charcoal	
Valley furnace	18.00	Lake Superior fur.	21.00
Pitts. dist. fur.	18.00	Do., del. Chicago	24.25
		Lyle, Tenn.	21.50

Silvery†

Jackson County, O., base; 6% $22.75; 7—$23.75; 8—$24.75; 9—$25.70; 10—$26.75; 11—$27.75. Buffalo base prices, up $1.25.

Bessemer Ferrosilicon†

Jackson County, O., base; 10%—$27.75; 11—$23.75; 12—$30.25; 13—$31.75; 14—$33.25; 15—$34.75; 16—$36.25. Buffalo base prices $1.25 higher.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Refractories

Per 1000 f.o.b. Works

Fire Clay Brick

First Quality.

Pa., Ill., Ky., Md., Ga., Mo.	$45.00
Alabama	45.00
Second Quality	
Pa., Ill., Ky., Md., Mo., Ga., Ala.	40.00
Ohio	
First quality	$40.00-45.00
Intermediary	37.00
Second quality	28.00

Malleable Bung Brick

All bases	50.00

Silica Brick

Pennsylvania	$45.00
Joliet, E. Chicago	54.00
Birmingham, Ala.	52.00

Magnesite

Imported dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags).... $45.00

Domestic dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags).. 40.00

Domestic dead-burned gr. net ton f.o.b. Chewelah, Wash. (bulk).. 22.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$45.00
Chemically bonded chrome brick	42.50
Magnesite brick	65.00
Chemically bonded magnesite brick	55.00

Fluorspar, 85-5

Washed gravel, duty paid, tide, net ton	$18.75-19.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads	$13.00-14.00

Ferroalloys

Dollars, except Ferrochrome

Ferromanganese, 78-82% tidewater, duty paid	85.00
Do., Balti. base	85.00
Do., del. Pittsburgh	90.13
Spiegeleisen, 19-20% dom. Palmerton, Pa., spot†	26.00
Do., New Orleans	26.00
Ferrosilicon, 50% freight all., cl.	77.50
Do., less carload	85.00
Do., 75 per cent Spot, $5 a ton higher.	126-130.00
Silicomang., 2½ carb.	90.00
2% carbon, 95.00; 1%.	105.00
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. con. del.	10.00
Ferrotungsten, stand., lb. cont. del.	1.35- 1.45
Ferrovanadium, 35 to 40% lb., cont., on analysis	2.70- 2.90
Ferrotitanium, c. l., prod. plant, frt. allow., net ton	137.50
Spot, 1 ton, frt. allow., lb.	7.00
do., under 1 ton	7.50
Ferrophosphorus, per ton, c. l., 17-19% Rockdale, Tenn., basis, 18%, $2 unitage	50.00
Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% $2.75 unitage	65.00
Ferromolybdenum, stand. 55-65%, lb.	0.95
Molybdate, lb. cont.	0.80

†Carloads, Quan. diff. apply

Nonferrous Prices

METAL PRICES OF THE WEEK

Spot unless otherwise specified. Cents per pound

	Copper: Electro. del Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin: New York Spot	Straits Tin: New York Futures	Lead N. Y.	Lead East St L.	Zinc St. L.	Aluminum 99%	Antimony Chinese Spot, N. Y.	Nickel Cathodes
June 15	9.00	9.12½	8.00	51.25	50.37½	4.00	3.85	4.30	*19.00	12.75	35.00
June 17	9.00	9.12½	8.00	50.75	50.00	4.00	3.85	4.30	*19.00	12.75	35.00
June 18	9.00	9.12½	8.00	51.00	50.12½	4.00	3.85	4.30	*19.00	12.75	35.00
June 19	9.00	9.12½	8.00	51.10	50.20	4.00	3.85	4.30	*19.00	12.75	35.00
June 20	9.00	9.12½	8.00	51.00	50.20	4.00	3.85	4.30	*19.00	12.75	35.00
June 21	9.00	9.12½	8.00	50.95	50.25	4.00	3.85	4.30	*19.00	12.75	35.00

*Nominal range 19.00 to 21.00c.

MILL PRODUCTS

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 9.00c Conn. copper.

Sheets	
Yellow brass (high)	14.25
Copper, hot rolled	16.00
Lead, cut to jobbers	7.75
Zinc, 100-lb. base	9.50
Tubes and Pipes	
High yellow brass	16.00
Seamless copper	16.25
Rods	
High yellow brass	12.75
Copper, hot rolled	13.25
Anodes	
Copper, untrimmed	13.75
Wire	
Yellow brass (high)	14.75

OLD METALS

Deal. buying prices, cents lb.

No. 1 Composition Red Brass	
*New York	4.25- 4.50
Cleveland	4.50- 5.00
Chicago	4.25- 4.50
*St. Louis	4.25- 4.50
Heavy Copper and Wire	
*New York, No. 1	5.50- 5.75
Chicago, No. 1	5.75- 6.00
Cleveland	5.25- 5.50
*St. Louis, No. 1	5.75- 6.00
Composition Brass Borings	
*New York	3.87½-4.12½
Light Copper	
*New York	4.25- 4.50
Chicago	4.25- 4.50
Cleveland	4.25- 4.50
*St. Louis	4.75- 5.00
Light Brass	
Chicago	2.25- 2.50
Cleveland	2.50- 2.75
*St. Louis	2.25- 2.50
Lead	
New York	3.00- 3.12½
Cleveland	2.75- 3.00
Chicago	2.75- 3.00
St. Louis	3.00- 3.25
Zinc	
New York	2.00- 2.25
*Cleveland	2.00- 2.25
St. Louis	2.50- 2.65
Aluminum	
Borings, Cleveland	7.50- 8.00
Mixed, cast, Cleve.	12.00-12.50
*Mixed, cast, St. L.	11.75-12.00
Clips, soft, Cleve.	13.50-14.00
SECONDARY METALS	
Brass ingott, 85-5-5-5	8.00
Stand. No. 12 alum.	16.00-17.00

Iron and Steel Scrap Prices

Corrected to Friday night Gross tons delivered to consumers, except where otherwise stated

HEAVY MELTING STEEL

Birmingham	8.50- 9.00
Boston, dock, expt.	8.50
Boston, domestic	7.00- 7.25
Buffalo, No. 1	10.75-11.25
Buffalo, No. 2	9.25- 9.75
Chicago, No. 1	9.75-10.25
Cleveland, No. 1	9.00- 9.50
Cleveland, No. 2	8.50- 9.00
Detroit, No. 1	8.00- 8.50
Detroit, No. 2	7.00- 7.50
Eastern Pa., No. 1	10.50
Eastern Pa., No. 2	9.00- 9.50
Federal, Ill.	8.00- 8.50
Granite City, R. R.	8.50- 9.00
Granite City, No. 2	7.25- 7.75
N. Y., deal, No. 2	7.50
N. Y., deal. barge	8.50
Pittsburgh, No. 1	11.75-12.25
Pittsburgh, No. 2	10.25-10.75
St. Louis	7.50- 8.00
Valleys, No. 1	11.50-12.00

COMPRESSED SHEETS

Buffalo, dealers	9.25- 9.75
Chicago, factory	8.50- 9.00
Chicago, dealer	7.50- 8.00
Cleveland	8.00- 8.50
Detroit	8.50- 9.00
E. Pa., new mat.	10.00
Pittsburgh	11.75-12.25
St. Louis	6.25- 6.75
Valleys	11.00-11.50

BUNDLED SHEETS

Buffalo	7.00- 7.50
Cincinnati, del.	6.00- 6.50
Cleveland	6.00- 6.50
Pittsburgh	10.25-10.75
St. Louis	4.50- 5.00

SHEET CLIPPINGS, LOOSE

Chicago	6.00- 6.50
Cincinnati	5.50- 6.00
Detroit	5.00- 5.50
St. Louis	4.25- 4.75

STEEL RAILS, SHORT

Birmingham	12.00-12.50
Buffalo	13.00-13.50
Chicago (3 ft.)	12.50-13.00
Chicago (2 ft.)	13.00-13.50
Cincinnati, del.	11.00-11.50
Detroit	10.50-11.00
Pitts., open-hearth, 3 ft. and less	14.00-14.50
St. Louis, 2 ft.& less	12.00-12.50

STEEL RAILS, SCRAP

Boston	7.50- 8.00
Chicago	9.75-10.25
Pittsburgh	13.00-13.50
St. Louis	9.75-10.25

STOVE PLATE

Birmingham	5.75- 6.00
Boston, dealers	3.50- 3.75
Buffalo	9.25- 9.75
Chicago, net	6.00- 6.50
Cincinnati, dealers	5.50- 6.00
Detroit, net	5.75- 6.25
Eastern Pa.	8.50
N. Y., deal. fdry.	6.00
St. Louis	5.50- 6.00

COUPLERS, SPRINGS

Buffalo	12.75-13.25
Chicago, springs	11.50-12.00
Eastern Pa.	13.50
Pittsburgh	14.50-15.00
St. Louis	8.50- 9.00

ANGLE BARS—STEEL

Chicago	12.00-12.50
St. Louis	9.50-10.00

RAILROAD SPECIALTIES

Chicago	11.50-12.00

LOW PHOSPHORUS

Buffalo, billets and bloom crops	12.75-13.25
Cleveland, billet, bloom crops	14.00-14.50
Eastern Pa., crops	13.00-14.00
Pittsburgh, billet, bloom crops	15.00-15.50
Pittsburgh, sheet bar crops	13.50-14.00

FROGS, SWITCHES

Chicago	10.00-10.50
St. Louis, cut	9.75-10.25

SHOVELING STEEL

Chicago	9.75-10.25
Federal, Ill.	7.50- 8.00
Granite City, Ill.	7.50- 8.00

RAILROAD WROUGHT

Birmingham	8.00- 8.50
Boston, dealers	6.00- 6.50
Buffalo, No. 1	9.25- 9.75
Buffalo, No. 2	10.75-11.25
Chicago, No. 1, net	8.50- 9.00
Chicago, No. 2	9.75-10.25
Cincinnati, No. 2	7.50- 8.00
Eastern Pa.	10.50-11.00
N. Y., No. 1, deal.	7.25- 7.75
St. Louis, No. 1	6.50- 7.00
St. Louis, No. 2	8.25- 8.75

SPECIFICATION PIPE

Boston	3.00- 3.25
Eastern Pa.	9.00- 9.50
New York, dealers	3.50- 4.00

BUSHELING

Buffalo, No. 1	9.25- 9.75
Chicago, No. 1	8.50- 9.00
Cinci., No. 1, deal.	6.00- 6.50
Cincinnati, No. 2	3.00- 3.50
Cleveland, No. 2	6.00- 6.50
Detroit, No. 1, new	7.00- 7.50
Valleys, new, No. 1	10.50-11.00

MACHINE TURNINGS

Birmingham	3.50- 4.00
Boston, dealers	2.00
Buffalo	4.50- 5.00
Chicago	5.00- 5.50
Cincinnati, dealers	3.50- 4.00
Cleveland	5.00- 5.50
Detroit	4.50- 5.00
Eastern Pa.	6.00- 6.50
New York, dealers	2.25- 2.50
Pittsburgh	8.00- 8.50
St. Louis	2.25- 2.75
Valleys	8.25- 8.50

BORINGS AND TURNINGS

For Blast Furnace Use

Boston, dealers	3.25- 3.50
Buffalo	6.00- 6.50
Cincinnati, dealers	3.50- 4.00
Cleveland	6.00- 6.50
Detroit	4.75- 5.25
Eastern Pa.	5.00
New York, dealers	1.50- 1.75
Pittsburgh	6.50- 7.00

CAST IRON BORINGS

Birmingham, plain	3.50- 4.00
Boston, chemical	5.50- 6.50
Boston, dealers	3.25- 3.50
Buffalo	6.00- 6.50
Chicago	5.00- 5.50
Cincinnati, dealers	3.50- 4.00
Cleveland	6.50- 7.00
Detroit	4.75- 5.25
E. Pa., chemical	11.00-12.00
New York, dealers	1.50- 1.75
St. Louis	2.00- 2.50

PIPE AND FLUES

Cincinnati, dealers	5.00- 5.50

RAILROAD GRATE BARS

Buffalo	7.50- 8.00
Chicago, net	6.00- 6.50
Cincinnati	4.00- 4.50
Eastern Pa.	8.50
New York, dealers	4.00- 4.50
St. Louis	4.50- 5.00

FORGE FLASHINGS

Boston, dealers	4.50
Buffalo	9.25- 9.75
Cleveland	8.00- 8.50
Detroit	7.00- 7.50
Pittsburgh	10.00-10.50

FORGE SCRAP

Boston, dealers	4.50
Chicago, heavy	10.50-11.00
Eastern Pa.	9.50-10.00

ARCH BARS, TRANSOMS

St. Louis	10.00-10.50

AXLE TURNINGS

Boston, dealers	3.00- 3.50
Buffalo	7.50- 8.00
Chicago, elec. fur.	9.50-10.00
Cleveland	7.00- 7.50
Eastern Pa.	9.50
St. Louis	7.00- 7.50

STEEL CAR AXLES

Birmingham	12.00-12.50
Boston, ship. point.	10.00-10.50
Buffalo	12.50-13.00
Chicago, net	12.50-13.00
Eastern Pa.	16.00
St. Louis	12.00-12.50

SHAFTING

Boston, ship. point.	12.00-12.25
Eastern Pa.	17.50
New York, dealers	13.00-13.25
St. Louis	11.00-11.50

CAR WHEELS

Birmingham	9.00-10.00
Boston, iron deal.	5.25- 5.50
Buffalo, iron	11.00-11.50
Buffalo, steel	12.75-13.25
Chicago, iron	10.00-10.50
Chicago, rolled steel	10.75-11.25
Cincinnati, iron	8.00- 8.50
Eastern Pa., iron	11.00
Eastern Pa., steel	13.50
Pittsburgh, iron	12.00-12.50
Pittsburgh, steel	14.50-15.00
St. Louis, iron	8.00- 8.50
St. Louis, steel	10.75-11.25

NO. 1 CAST SCRAP

Birmingham	8.50- 9.50
Boston, No. 1 mach.	8.50- 9.00
Boston, No. 2	7.50- 8.00
Boston, tex. con.	8.50- 9.00
Buffalo, cupola	10.75-11.25
Buffalo, mach.	11.50-12.00
Chicago, agri. net	7.50- 8.00
Chicago, auto	9.00- 9.50
Chicago, mach. net	9.00- 9.50
Chicago, railr'd net	8.00- 8.50
Cinci., mach. cup.	8.50- 9.00
Cleveland, cupola	11.50-12.00
Detroit, net	9.50-10.00
Eastern Pa., cupola	11.00-12.00
E. Pa., mixed yard	8.50- 9.50
Pittsburgh, cupola	13.00-13.50
San Francisco, del.	13.50-14.00
Seattle	7.00- 8.50
St. Louis, No. 1	8.00- 8.50
St. L., No. 1 mach.	9.00- 9.50

HEAVY CAST

Boston, del.	5.25- 5.50
Buffalo, break.	8.50- 9.00
Cleveland, break.	7.50- 8.00
Detroit, No. 1, mach. net	10.00-10.50
Detroit, break.	7.00- 7.50
Detroit, auto net	10.50-11.00
Eastern Pa.	10.50
N. Y., break. deal.	6.25- 6.75
Pittsburgh	11.50-12.00

MALLEABLE

Birmingham, R. R.	10.50-11.00
Boston, consum.	12.00-12.50
Buffalo	13.00-13.50
Chicago, R. R.	13.00-13.50
Cincinnati, agri. del.	8.50- 9.00
Cleveland, rail	12.00-12.50
Detroit, auto	10.00-10.50
St. Louis, R. R.	10.75-11.25
Eastern Pa., R. R.	11.00-11.50

RAILS FOR ROLLING

5 feet and over

Birmingham	10.50-11.00
Boston, dealers	8.00- 8.50
Buffalo	11.00-11.50
Chicago	10.50-11.00
Eastern Pa.	12.50-13.00
New York, dealer	7.50- 8.00
St. Louis	10.00-10.50

LOCOMOTIVE TIRES

Chicago (cut)	11.50-12.00
St. Louis, No. 1	9.00- 9.50

LOW PHOS. PUNCHINGS

Buffalo	12.50-13.00
Chicago	12.00-12.50
Eastern Pa.	13.00-14.00
Pittsburgh (heavy)	13.50-14.00
Pittsburgh (light)	13.00-13.50

Iron Ore

Lake Superior Ore

Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.80
Mesabi nonbess.	4.50
High phosphorus	4.40
Mesabi bessemer	4.65
Old range nonbess.	4.65

Eastern Local Ores

Cents, unit, del. E. Pa.

Foundry and basic 56-63% con. (nom.)	8.00- 9.00
Cop.-free low phos. 58-60% (nom.)	10.00-10.50

Foreign Ore

Cents per unit, f.a.s. Atlantic ports (nominal)

Foreign manganiferous ore, 45.55% iron, 6-10% man.	10.00
No. Afr. low phos.	10.00
Swedish basic, 65%	9.00
Swedish low phos.	10.00
Spanish No. Africa basic, 50 to 60%	9.00
*Tungsten, spot, sh. ton unit, duty pd.	$15.50-16.00
N. F. fdy., 55%	7.00
Chrome ore, 48% gross ton, c.i.f.	$18.00-19.50

Manganese Ore

(Nominal)

Prices not including duty, cents per unit cargo lots.

Caucasian, 52-55%	26.00
So. African, 52%	26.00
So. Afr., 49-51%	24.00
Indian, 58-60%	nominal
Indian, 48-50%	nominal

Warehouse Iron and Steel Prices

Cents per pound for delivery within metropolitan districts of cities specified

STEEL BARS

Baltimore*	2.95c
Boston††	3.00c
Buffalo	3.00c
Chattanooga	3.31c
Chicago	2.95c
Cincinnati	3.17c
Cleveland	2.95c
Detroit	3.04c
Houston	3.00c
Los Angeles	3.60c
Milwaukee	3.06c
New Orleans	3.30c
New York‡(d)	3.26c
Pittsburgh (h)	2.90c
Philadelphia*	2.93c
San Francisco	3.60c
Seattle	3.60c
St. Louis	3.19c
St. Paul	3.00c
Tulsa	3.25c

IRON BARS

Portland	3.40c
Chattanooga	3.31c
Baltimore*	3.05c
Chicago	2.75c
Cincinnati	3.17c
New York‡(d)	3.36c
Philadelphia*	2.93c
St. Louis	3.19c
Tulsa	3.25c

REINFORCING BARS

Buffalo	2.60c
Chattanooga	3.31c
Chicago	2.10c-2.60c
Cleveland (c)	2.10c
Cincinnati	3.25c
Houston	3.25c
Los Ang., cl.	2.45c
New Orleans	3.50c
Pitts., plain (h)	3.05c
Pitts., twisted squares (h)	3.175c
San Francisco	2.45c
Seattle	2.45c
St. Louis	3.24c
Tulsa	3.25c
Young.	2.30c-2.60c

SHAPES

Baltimore*	3.00c
Boston††	3.19c
Buffalo	3.25c
Chattanooga	3.56c
Chicago	3.20c
Cincinnati	3.42c
Cleveland	3.31c
Detroit	3.42c
Houston	3.00c
Los Angeles	3.60c
Milwaukee	3.31c
New Orleans	3.55c
New York(d)	3.37c
Philadelphia*	2.98c
Pittsburgh(h)	3.15c
Portland	3.55c
San Francisco	3.55c
Seattle	3.55c
St. Louis	3.44c
St. Paul	3.25c
Tulsa	3.50c

PLATES

Baltimore*	3.00c
Boston††	3.21c
Buffalo	3.37c
Chattanooga	3.56c
Chicago	3.20c
Cincinnati	3.42c
Cleveland, ¼-in. and over	3.31c
Detroit	3.42c
Detroit, ⅜-in.	3.65 c
Houston	3.00c
Los Angeles	3.60c
Milwaukee	3.31c
New Orleans	3.55c
New York(d)	3.40c
Philadelphia*	2.98c
Phila. floor	4.95c
Pittsburgh(h)	3.15c
Portland	3.55c
San Francisco	3.55c
Seattle	3.55c
St. Louis	3.44c
St. Paul	3.25c
Tulsa	3.50c

NO. 10 BLUE

Baltimore*	3.10c
Boston††	3.30c
Buffalo	3.62c
Chattanooga	3.36c
Chicago	3.05c
Cincinnati	3.22c
Cleveland	3.11c
Det., 8-10 ga.	3.14c
Houston	3.35c
Los Angeles	3.70c
Milwaukee	3.16c
New Orleans	3.55c
New York	3.31c
Portland	3.75c
Philadelphia*	3.08c
Pittsburgh(h)	2.95c
San Francisco	3.75c
Seattle	3.75c
St. Louis	3.29c
St. Paul	3.45c
Tulsa	3.70c

NO. 24 BLACK

Baltimore*†	3.60c
Boston (g)	3.95c
Buffalo	3.25c
Chattanooga	4.21c
Chicago	3.85c
Cincinnati	4.07c
Cleveland	3.91c
Detroit	3.94c
Los Angeles	4.35c
Milwaukee	3.96c
New York	3.89c
Philadelphia*†	3.60c
Pitts.** (h)	3.55c
Portland	4.40c
San Francisco	4.40c
Seattle	4.40c
St. Louis	4.09c
St. Paul	3.695c
Tulsa	4.75c

NO. 24 GALV. SHEETS

Baltimore*†	4.30c
Buffalo	4.00c
Boston (g)	4.65c
Chattanooga	4.86c
Chicago (h)	4.55c
Cincinnati	4.72c
Cleveland	4.61c
Detroit	4.72c
Houston	4.40c
Los Angeles	4.95c
Milwaukee	4.66c
New Orleans	4.50c
New York	4.50c
Philadelphia*†	4.30c
Pitts** (h)	4.15-4.45c
Portland	5.00c
San Francisco	5.00c
Seattle	5.00c
St. Louis	4.79c
St. Paul	4.19c
Tulsa	5.10c

BANDS

Baltimore*	3.20c
Boston††	3.30c
Buffalo	3.42c
Chattanooga	3.61c
Chicago	3.30c
Cincinnati	3.47c
Cleveland	3.36c
Detroit, ⅜-in. and lighter	3.39c
Houston	3.25c
Los Angeles	4.10c
Milwaukee	3.41c
New Orleans	3.95c
New York(d)	3.56c
Philadelphia	3.18c
Pittsburgh(h)	3.20c
Portland	4.25c
San Francisco	4.25c
Seattle	4.25c
St. Louis	3.54c
St. Paul	3.20c
Tulsa	3.45c

HOOPS

Baltimore	2.30c
Boston	4.30c
Buffalo	3.42c
Chicago	3.30c
Cincinnati	3.47c
Det., No. 14 and lighter	3.39c
Los Angeles	5.85c
Milwaukee	3.41c
New York	3.56c
Philadelphia	3.43c
Pittsburgh(h)	3.70c
Portland	5.60c
San Francisco	6.15c
Seattle	5.60c
St. Louis	3.54c
St. Paul	3.75c

COLD FIN. STEEL

Baltimore (c)	3.58c
Boston	3.75c-3.90c
Buffalo (h)	3.40c
Chattanooga*	3.98c
Chicago (h)	3.35c
Cincinnati	3.57c
Cleveland (h)	3.35c
Detroit	3.49c
Los. Ang.(f) (d)	5.70c
Milwaukee	3.46c
New Orleans	4.15c
New York	3.81c-4.31c
Philadelphia	3.61c
Pittsburgh	3.20c
Portland (f)	5.85c
San Fran.(f) (d)	5.80c
Seattle (f) (d)	5.85c
St. Louis	3.59c
St. Paul	3.05c
Tulsa	4.50c

COLD ROLLED STRIP

Boston, 0.100-in., 500 lb. lots	5.35c
Buffalo	3.39c
Chicago	3.27c
Cincinnati (b)	3.44c
Cleveland (b)	3.20c
Detroit	3.33c
New York	3.36c
St. Louis	3.36c

TOOL STEELS

(Applying on or east of Mississippi river; west of Mississippi 1c up)

	Base
High speed	57c
High carbon, high chrome	37c
Oil hardening	22c
Special tool	20c
Extra tool	17c
Regular tool	14c

Uniform extras apply

BOLTS AND NUTS

(100 pounds or over)

	Discount
Chicago (a)	70
Cleveland	70
Detroit	70–5
Milwaukee	70
Pittsburgh	70

(a) Under 100 pounds, 65 off.

(b) Plus straightening, cutting and quantity differentials; (c) Plus mill, size and quantity extras; (d) Minus quant. diff.; (e) New mill classif.; (f) Rounds only; (g) 50 bundles or over; (h) Outside delivery, 10c less.

‡Domestic bars; *Plus quan. extras; **Under 25 bundles; *†50 or more bundles; †New extras apply; ††Base 40,000 lbs., extras on less.

Prices on heavier lines are subject to new quantity differentials; 399 lbs. and less, up 50 cts.; 400 to 9999 lbs., base; 10,000 to 19,999 lbs., 15 cts. under; 20,000 to 39,999 lbs., 25 cts. under; 40,000 lbs. and over, 35 cts. under base.

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, June 20

Export Prices f. o. b. Ship at Port of Dispatch—By Cable (or Radio)

	British gross tons U. K. ports £ s d	Continental Channel or North Sea ports, metric tons Quoted in dollars at current value	**Quoted in gold pounds sterling £ s d
PIG IRON			
Foundry, 2.50-3.00 Silicon	$15.44 3 2 6	$13.70	1 14 0
Basic bessemer	15.44 3 2 6*	12.89	1 12 0
Hematite, Phos. .03-.05	15.56 3 3 0	.....	.....
SEMIFINISHED STEEL			
Billets	$27.17 5 10 0	$18.93	2 7 0
Wire rods, No. 5 gage	41.99 8 10 0	36.28	4 10 0
FINISHED STEEL			
Standard rails	$38.29 7 15 0	$44.34	5 10 0
Merchant bars	1.66c 7 10 0	1.14c to 1.19c	3 2 6 to 3 5 0
Structural shapes	1.63c 7 7 6	1.15c	3 1 6
Plates, †¼ in. or 5 mm.	1.77c 8 0 0	1.51c	4 2 6
Sheets, black, 24 gage or 0.5 mm.	2.04c 9 5 0	2.12c	5 16 0††
Sheets, gal., 24 gage, corr.	2.44c 11 5 0	3.19c	8 15 0
Bands and strips	1.88c 8 10 0	1.46c	4 0 0
Plain wire, base	2.04c 9 5 0	1.95c	5 7 6
Galvanized wire, base	2.38c 10 15 0	2.28c to 2.32c	6 5 6 to 6 7 6
Wire nails, base	2.65c 12 0 0	2.10c	5 15 0
Tin plate, box 108 lbs.	$ 4.45 0 18 2	.....	.....

British ferromanganese $85 delivered Atlantic seaboard, duty-paid. German ferromanganese £9 0s 0d $(43.74) f.o.b.

Domestic Prices at Works or Furnace—Last Reported

	£ s d		French Francs		Belgian Francs		Reich Marks
Fdy. pig iron, Si. 2.5	$16.67 3 7 6(a)	$17.21	260	$12.54	370	$25.43	65
Basic bessemer pig iron	16.67 3 7 6(a)*	12.25	185	11.18	330	28.06 (b)	69.50
Furnace coke	4.08 0 16 6	7.94	120	3.73	110	7.67	19
Billets	27.17 5 10 0	28.47	430	18.31	540	38.96	96.50
Standard rails	1.82c 8 5 0	2.08c	694	1.65c	1,100	2.42c	132
Merchant bars	1.90c 8 12 0	1.68c	560	90c	600	2.01c	110
Structural shapes	1.93c 8 15 0	1.65c	550	90c	600	1.97c	107.50
Plates, †¼-in. or 5 mm.	2.00c 9 1 3	2.10c	700	1.13c	750	2.32c	127
Sheets, black	2.32c 10 10 0§	2.10c	700‡	1.24c	825‡	2.64c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	2.87c 13 0 0	3.81c	1,270	2.25c	1,500	6.77c	370
Plain wire	2.04c 9 5 0	3.39c	1,130	1.65c	1,100	3.17c	173
Bands and strips	2.07c 9 7 0	1.95c	650	1.26c	840	2.32c	127

*Basic. †British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price British quotations are for basic open-hearth steel. Continental usually for basic-bessemer steel a del. Middlesbrough. b hematite. ††Close annealed

**Gold pound sterling carries a premium of 65.50 per cent over paper sterling.

Bars

Bar Prices, Page 62

Pittsburgh—Heavy farm implement buying of merchant bars is still a feature and recently details were announced on the first orders placed in this country by the Mexican department of agriculture. B. S. Avery Co., Louisville, Ky., received orders for 10,000 plows, a carload of harrows and a carload of cultivators. International Harvester Co. has taken orders for a carload of planters, 14 threshers, and 14 tractors. Merchant bars in miscellaneous form are required in large amount for completion of these orders. Domestic demand for farm implements is also a feature, and there is other export business of moment aside from the Mexican orders. Marion Steam Shovel Co., Marion, O., has taken an order for a large electric power excavating machine and a smaller shovel, valued at about $500,000, to be used in Illinois. New specifications are now coming out for parts covering 1936 models. Soft steel bars are quoted 1.80c, Pittsburgh, and alloy steel bars hold at the 2.45c, market.

Cleveland—Some leading automobile manufacturers indicate they will make substantial purchases of steel bars for fall models some time in July. One large buy is scheduled for about July 19. Meanwhile, specifications from the automobile industry continue to decline. Some fairly good orders were placed by truck and rim manufacturers, and demand from agricultural implement manufacturers is fairly steady. Prices are firm.

Chicago—Demand for bars from the agricultural trade continues in substantial volume, and steel sellers report some makers are pushing for shipments. Tractor divisions are especially active. Bar buying in general is somewhat freer.

Boston—Buying is steady, but not heavy, with consumers taking shipments generally in small lots. Demand is largely for miscellaneous needs. Prices are steady and few buyers are pressing for lower quotations.

New York—Following dullness early this month, commercial steel bar business for the past two weeks has been improved. Steadiness in prices has had the effect of bringing out consumers, who, immediately following the NRA decision, withdrew from the market until conditions clarified.

Philadelphia—Sales of steel bars are light, with cold-finishers, jobbers and bolt and nut manufacturers taking little. Jobber stocks are said to be 40 to 50 per cent under normal.

Youngstown, O.—Unexpected inflow of specifications from agricultural implement makers for steel bars, both new and rail steel, is keeping district mills busy when added to the usual needs of routine consumers.

Plates

Plate Prices, Page 62

Pittsburgh—Ohio River Co., Cincinnati, probably will now delay buying the ten 195 x 35 x 11-foot barges, requiring 2300 tons of plates, award of which appeared promising at one time late last week, but which subsequently was postponed. Ohio River Co. is also inquiring for a 170-foot towboat that will require about 350 tons of plates, mainly 5/16-inch thickness. Mississippi Valley Barge Lines Co., Cincinnati, has tentatively set July 1 as the closing date on either 30 large or 40 small steel barges. Monongahela & Ohio Dredging Co. has purchased steel tanks for installation on existing open barges, permitting the barging of gasoline from the lower Mississippi river into Pittsburgh.

Cleveland—Carload orders from manufacturers of small tanks and boilers have increased, and these buyers have not asked for price concessions, but for early delivery. The oil equipment industry is especially promising. Award of 5125 freight cars by Chesapeake & Ohio railroad is scheduled for this week, and this will bring demand for approximately 65,000 tons of steel mainly plates. The cars are to be delivered by August.

Chicago—New buying and inquiry have increased somewhat, but still leave considerable room for improvement. The Ft. Smith, Ark., waterworks project will take 5252 tons of plates. Several smaller jobs, largely government financed, will take smaller tonnages. A few jobs are coming from the oil industry, including one in Texas which will require about 1500 tons.

Boston—More large tank work is being planned by several oil companies, although little has reached the bidding stage. An exception is an 80,000-barrel structure for a New Haven, Conn., fuel distributor. Meanwhile buying in small lots holds to the recent rate with prices firm.

Philadelphia—Apart for scattered ship work little plate tonnage is being figured and most of this at the moment is for the navy, which opened bids Tuesday on about 950 tons for various yards. Some apparent irregularities in the bids are being checked. The new navy program on which specifications originally were expected to be out the middle of June is being delayed. Strike of New York Ship Building Co. at Camden, N. J., is in seventh week with no early ending in sight. Bids to the Pennsylvania on plates and other steel revealed firm prices.

New York—With little more than a week remaining of this quarter, third quarter buying is more in evidence. However, there is little or no actual contracting for the quarter as a whole, with consumers generally buying on a nearby basis. Tank work is featureless. Two or three important oil company projects are still pending, but orders are being held back. Prices are unchanged.

San Francisco—It is expected that federal funds will be obtained for two pipe lines in southern California, one for the metropolitan water district, Los Angeles, requiring 10,000 tons of plates for a 120-inch line, and one for San Diego, Calif., taking 4000 tons.

Seattle—Plans for a $2,000,000 Seattle water system extension have been prepared and the city has taken definite steps to finance the project which involves 27 miles of steel pipe, 20, 24 and 42-inch, and two large concrete reservoirs. Tonnages of steel required are unstated. Tacoma is awaiting official approval of financing details for a water system improvement involving 1800 tons of pates.

Contracts Placed

1265 tons, gas-holder, Troy, N. Y., to Bartlett-Hayward Co., Baltimore.

300 tons, dump scow at Grand Haven, Mich., to McClintic-Marshall Corp., Bethlehem, Pa.

245 tons, petroleum products bulk storage plant, Carolina Terminal Inc., Wilmington, N. C., to Chicago Bridge & Iron Works, Chicago.

245 tons, one million-gallon standpipe, Illinois Water Service Co., Freeport, Ill., to Chicago Bridge & Iron Works, Chicago.

200 to 300 tons, plates, bars and shapes, mainly plates, tunnel liners for the four-mile sewer at Hazelwood, Pittsburgh, to Youngstown Steel Car Corp., Niles, O., through Mike Manella, Pittsburgh.

Unstated tonnage, 125,000-gallon elevated water tank, national guard camp, Hattiesburg, Miss., to R. D. Cole Mfg. Co., Newnan, Ga., $11,939.

Unstated, 80,000-barrel fuel tank for Longview Fibre Co., Longview, Wash., to Chicago Bridge & Iron Works, Chicago.

Contracts Pending

10,000 tons, five miles of 120-inch pipe, metropolitan water district, Los Angeles. Plans prepared and federal funds sought.

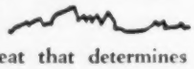
4000 tons, pipe line, San Diego, Calif.; plans prepared and federal funds sought.

2650 tons, including 2300 tons in ten 195 x 35 x 11-foot steel coal barges, and one 170-foot towboat (350 tons, mainly 5/16-inch plates), the Ohio River Co., Cincinnati.

1500 tons, oil storage tanks, Shell Petroleum Corp., Houston, Tex.

WHAT EVERY WELDING OPERATOR SHOULD KNOW...

ABOUT UNIFORM HEAT

Current fluctuations in your arc welder mean uneven heat . . . irregular penetration . . . variations in metal fusion . . . lack of uniform strength. That's when the oscillograph record looks like this: 
It's uniform heat that determines the strength and quality of your welds. When the oscillograph record looks like this:
the welds will be of uniform penetration and density. And they'll be uniform from one weld to another.

That's why P&H-Hansen puts so much emphasis on uniform heat delivery at the arc . . . why the stable arc characteristic is "built in" — not artificially produced by separate stabilizers. Study the P&H-Hansen features. Ask for the 24-page Bulletin "Weld It Well".

HARNISCHFEGER CORPORATION
4411 W. National Ave., Milwaukee, Wis.

P&H HANSEN ARC WELDERS

225 tons, bureau of supplies and accounts, navy department, Washington; 150 tons for delivery to Portsmouth, N. H., 75 tons to Mare Island, Calif.; bids June 25; schedule 5347.

Unstated, 27 miles 20, 24 and 42-inch water system extension, Seattle; plans prepared, financing under way.

Transportation

Track Material Prices, Page 63

Car building is being undertaken by two railroads. PWA has approved a loan of $1,040,000 to the Norfolk Southern for financing 500 steel box cars at cost of $1,155,000, the road providing the difference. Chicago, Burlington & Quincy will start assembly of 500 cars in its own shops about July 1, materials having already been bought.

Chesapeake & Ohio has postponed awards on its inquiry for 5125 freight cars until June 24. New York board of transportation has made no award on 500 subway cars for which bids were opened several days ago. Grand Trunk Western is inquiring for 150 seventy-ton gondolas.

Bangor & Aroostook has placed three locomotives and the Aliquippa & Southern a switcher, all going to American Locomotive Co., New York.

Union Switch & Signal Co., Swissvale, Pa., has been awarded a contract for electrical equipment for an extension of the New York municipal subway in Queens.

Missouri Pacific has been granted permission by a federal court to buy 10,000 tons of steel rails, "in anticipation of a possible increase of price," the permission reads. Cost of the rails and fastenings is expected to be about $573,000. The Wabash is asking bids on 5000 tons of rails for delivery during July and August.

Locomotives Placed

Bangor & Aroostook, two locomotives of the 4-8-2 type, to the American Locomotive Co., New York.

Aliquippa & Southern, one switch engine, to the American Locomotive Co., New York.

Car Orders Pending

Grand Trunk Western, 150 seventy-ton gondolas; bids asked.

Rail Orders Pending

Wabash, 5000 tons for July and August delivery; bids asked.

Buses Placed

American Car & Foundry Motors Co., New York: Twenty-six city coaches for Memphis Street Railway Co., Memphis, Tenn.

THERE'S EXTRA PROTECTION FOR YOU IN MOTOR CONVERTIBILITY

With the new P&H Convertibles you can change an open type motor into enclosed fan-cooled, splash-proof or totally enclosed construction.

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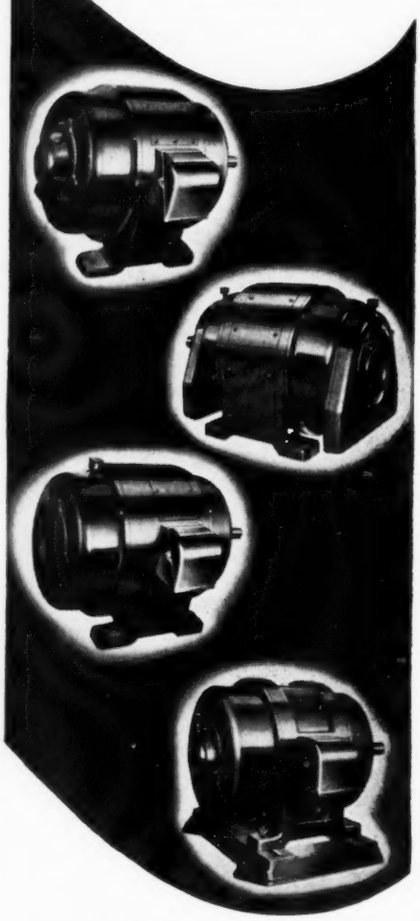


P&H CONVERTIBLE MOTORS

Sheets

Sheet Prices, Page 62

Philadelphia — More than 35,000 tons of hot-rolled sheets for Chevrolet car frames are reported placed by the E. G. Budd Mfg. Co. here with a local district mill, shipments to extend over several months, and prices subject to quarterly adjustment to conform with the going market as generally announced. Bethlehem Steel Co. booked about 100 tons of license tag stock for the District of Columbia, and a West Virginia mill received an order for two carloads of sheets for the federal prison at Lewisburg, Pa. Otherwise the market here is quiet.

Pittsburgh—Sheet mill operations are fairly steady, with common black operations about 50 per cent, galvanized sheet output off slightly to 49 per cent, and full finished temporarily down because of staggered production in some plants. Miscellaneous orders still are prominent and prices on this business are firm. The market is quoted 2.40c, base, Pittsburgh, on black sheets; 3.10c on galvanized, and 1.85c on heavy hot rolled. Cold-rolled grades are 2.95c for light gage base, and 2.50c for the 10 gage base.

Cleveland—The market is quieter, with sheet mills here and in an adjacent lake district operating at 40 to 50 per cent. Specifications from the automobile industry are mainly for rounding out stocks. A substantial order was placed for Ford running board material. Demand from refrigerator manufacturers has slowed up, while that from stovemakers has improved slightly.

Chicago—Inland Steel Co. has established a Gary, Ind., base on enameling sheets, No. 10 gage being quoted 2.60c and No. 20 at 3.20c or 10 cents over Pittsburgh base. These new base prices are effective at once and mean a considerable saving to midwestern consumers since the Pittsburgh-Chicago freight was approximately 36 cents. Other sellers are expected to quote similarly. Although the prices were filed with the Steel institute, this was considered an exception, and does not indicate that prices generally will be filed, as under the code.

A slight gain is reported in specifications for automotive sheets for the last runs on current models. Demand from the general manufacturing trade is well sustained but tapering.

New York—While various alternates were bid, it appears that sheet sellers quoted firm prices throughout on several hundred tons of license tag stock for the state of New York last week. Further, no one quoted for delivery beyond Sept. 30, although it was requested that bids cover shipments over the entire last half. In view of uniformity of prices, it is believed that a New York state producer will get the business. A minimum of 644 tons of sheets was requested. General sheet business is lagging.

Boston—Sheet demand is dull, with buying less active than a week ago. Industrial fabricators, including builders of small tanks, electrical goods, refrigerators and containers are taking light shipments. Cold finished sheets have held better than the average. Prices are unchanged.

Buffalo—Sheet mill operations here are at 65 per cent. Further curtailment by the end of the month is probable. Backlogs have shrunk to a fraction of their average during the first five months of the year.

Youngstown, O.—A fair volume of miscellaneous orders for the various grades of sheets continues to reach district mills and shipping instructions follow closely, indicating material is going directly into consumption. Stovemakers and agricultural implement

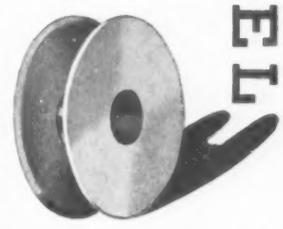
ULTRA-CUT STEEL

ANOTHER NEW RECORD

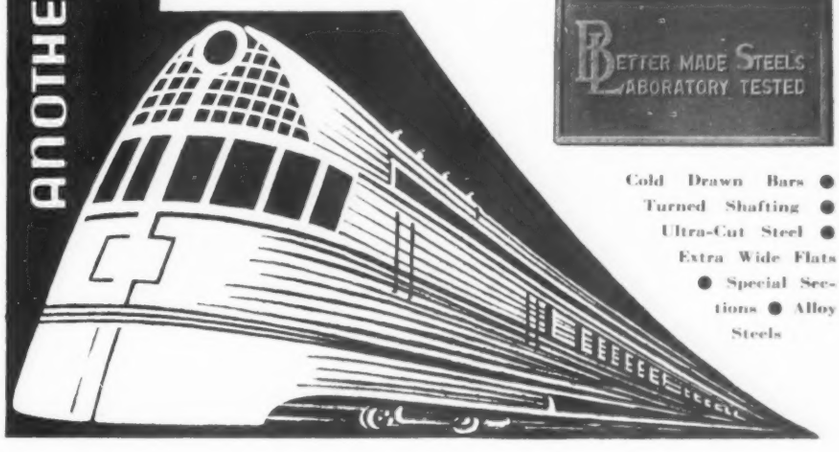
gives you "Streamline" production by reducing the cutting resistance on your automatic screw machines. It feeds faster, machines smoother and runs longer between tool grinds.

The "spool" at the right typifies the unusual machinability of this modern high-speed screw stock. On clocked tests, Ultra-Cut showed 42% increase in output over SAE 1112, raising the hourly production from 36 to 51 pieces while maintaining the same tool life. This item was fabricated from $\frac{7}{8}$" Ultra-Cut at a speed of 278 S.F.M. against 120 for the other stock.

If you could duplicate these results on your own machines, would Ultra-Cut be worth trying? Hundreds of satisfied users have answered "yes"! Let us demonstrate some samples of Ultra-Cut screw stock in your own plant.



Ultra-Cut Folder No. 3-S will be sent on request



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Cold Drawn Bars ● Turned Shafting ● Ultra-Cut Steel ● Extra Wide Flats ● Special Sections ● Alloy Steels

Gliding so smoothly that the passengers hardly noticed the amazing speed, the Burlington Steamlined Zephyr recently flashed to a new record round-trip run from Chicago to St. Paul —862 miles in 705 minutes including stops, and 102 miles an hour on straight runs.

BLISS & LAUGHLIN, INC.

HARVEY, ILL. *Sales Offices in all Principal Cities* BUFFALO, N.Y.

builders are taking up some of the slack from the drop in automotive.

Cincinnati—Sheet mill operations are holding fairly well but disclose seasonal effects on automotive manufacturing and in household equipment lines. Galvanized demand remains strong. Ordering is keyed to early needs. Prices are reported firm.

St. Louis — Purchasing of sheets is well diversified, but lighter. Automotive releases have declined, and miscellaneous requirements continue to account for the major part of the tonnage moving.

Birmingham, Ala.—Sheet demand is slow, but mills expect to ship their surplus stock shortly.

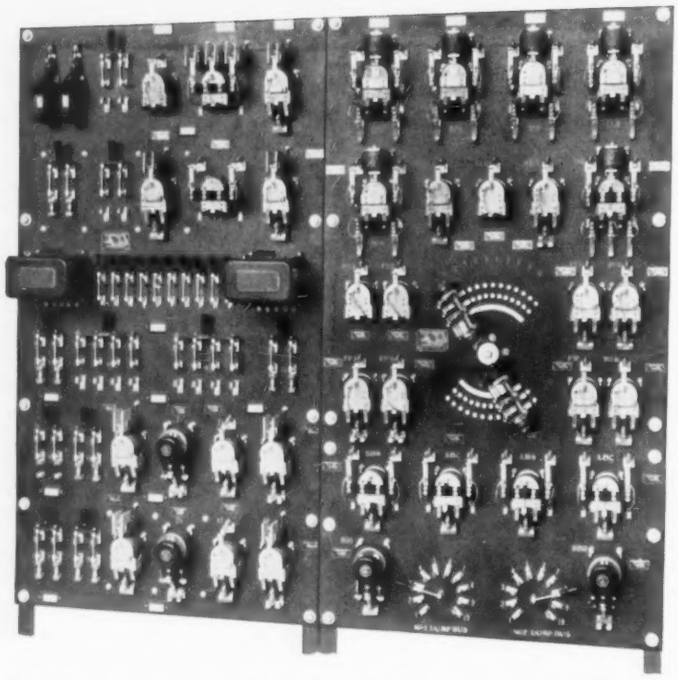
Seattle—Sheets are leading other out-of-stock items in this district, due to increased construction activity. New work is not as important as repair jobs which are requiring larger tonnages of all grades.

Tin Plate

Tin Plate Prices, Page 62

Pittsburgh—Tin plate production last week dropped 10 points to 65 per cent. A leading interest was scheduled at 59-60 per cent for the week. Capacity mill warehouse stocks are moving slowly, although favorable crop reports are heard. Prices on tin mill products are steady.

CLARK..
AUTOMATIC STEEL MILL CONTROL EQUIPMENT



Complete Automatic Clark Control Equipment for the automatic operation of Blast Furnace Stock Line Recorder and Blast Furnace Charging Equipment as engineered by Freyn Engineering Co. of Chicago.

Another example of Clark's ability in the special control field.

THE CLARK CONTROLLER CO.
1146 East 152nd St.
CLEVELAND, OHIO

Pipe

Pipe Prices, Page 63

Pittsburgh—Financing details are still delaying award of several attractive line pipe projects. One such is the 162-mile natural gas line from Glenda, Wyo., to Bridgeport, Nebr., for the North Central Gas Co.; another the projected line from the Allen Lake and Medicine Bow fields in southern Wyoming to Cheyenne, Wyo. Lone Star Gas Co. is beginning to re-lay 98 miles of 20-inch line pipe from Dallas, Tex., to the Cayuga, Tex., field, Anderson county. Operations of pipe producers are estimated at 35 to 40 per cent.

Cleveland—For Cleveland's easterly sewage disposal plant 200 tons of cast pipe were awarded, and the city is expected to place 600 tons additional for a sludge line, having opened bids on this item last week. Demand for cast pipe from public works of all descriptions is light.

Chicago—A few municipal projects requiring usually less than 100 tons of cast pipe each continue to appear before the trade, but the aggregate volume is relatively light. All prices appear well maintained.

New York—Cast pipe inquiry is light and buying is confined largely to small lots. Another New York city inquiry for several hundred tons is expected out shortly. Washington has bids on slightly over 1000 tons, mostly 6-inch. Cast pipe prices are steadier following the recent advance, but are not subject to much test. About 100 tons of cast and steel pipe will be required for the New York tunnel approach and plaza, Manhattan-Weehawken, N. J., tunnel.

Birmingham, Ala.—Expected cast pipe business is slow in developing. However, a number of PWA and private projects are reported which will require pipe. Warehouse stocks are undepleted.

St. Paul — Natural gas interests in the Montana-North Dakota area are reported planning to ask the PWA for loan of $30,000,000 to build a pipe line to transport natural gas from North Dakota to this district. The line will be laid through Bowman, Bismarck, Jamestown and Fargo, N. Dak.

San Francisco—The largest pending pipe project calls for from 1500 to 3500 tons of 60-inch pipe for the White Point outfall sewer, Los Angeles, up for bids on July 2. In-

quiries are more numerous and bookings so far this year aggregate 20,882 tons, compared with 13,615 tons for the corresponding period in 1934.

Seattle—Cast iron pipe is meeting better demand as water system extensions and sewage disposal plants come up for figures in the Pacific Northwest. No large tonnages are immediately pending but the outlook is better. Grants Pass and Jacksonville, Oreg., will open bids June 28 and 27, respectively, for municipal improvements requiring unstated tonnages of cast pipe.

Cast Pipe Placed

200 tons, various sizes, blower building, easterly sewage disposal plant, Cleveland, to United States Pipe & Foundry Co., Burlington, N. J.; through Smith & Oby Co., Cleveland, subcontractor.

100 tons, 2 and 4-inch, Orangeville, Utah, to Pacific States Cast Iron Pipe Co., Provo, Utah.

Cast Pipe Pending

5252 tons, waterworks project, Fort Smith, Ark.

1500 to 3500 tons, 60-inch, White Point outfall sewer, Los Angeles; bids July 2.

1080 tons, mostly 6-inch, Washington; bids in.

375 tons, 4 to 8-inch, Riverside, Calif., to United States Pipe & Foundry Co., Burlington, N. J.

232 tons, 8 and 12-inch, San Bernardino, Calif.; bids in.

181 tons, 4-inch, Garden City, Utah; bids June 25.

165 tons, 12-inch, Spokane to Pacific States Cast Iron Pipe Co., Provo, Utah.

125 tons, 8 and 12-inch, also accessories, Fifty-sixth avenue improvement, Seattle; bids in.

118 tons, 4 to 8-inch, Inglewood, Calif.; United States Pipe & Foundry Co., Burlington, N. J., low.

Steel Pipe Placed

350 tons, Fort Morgan, Colo., to Thompson Mfg. Co., Denver.

Strip Steel

Strip Prices, Page 63

Pittsburgh—Stamping shops making small automotive parts, have begun issuing their last specifications for strip steel on 1935 models. In addition, specifications are now appearing from these sources in revised strip specifications covering 1936 models. The miscellaneous group of buyers on strip are still a backbone to the market. Such strip users as those making small tanks, drums, and metal furniture are especially active. Buyers are paying 1.85c, base, on hot strip, and 2.60c, Pittsburgh or Cleveland, base, for cold-rolled strip.

Cleveland—Strip production here has dropped to 30 per cent, specifications recently having shown a much sharper decline, relatively, than those for sheets. Few orders are developing from the automobile industry, and miscellaneous requirements also are lighter.

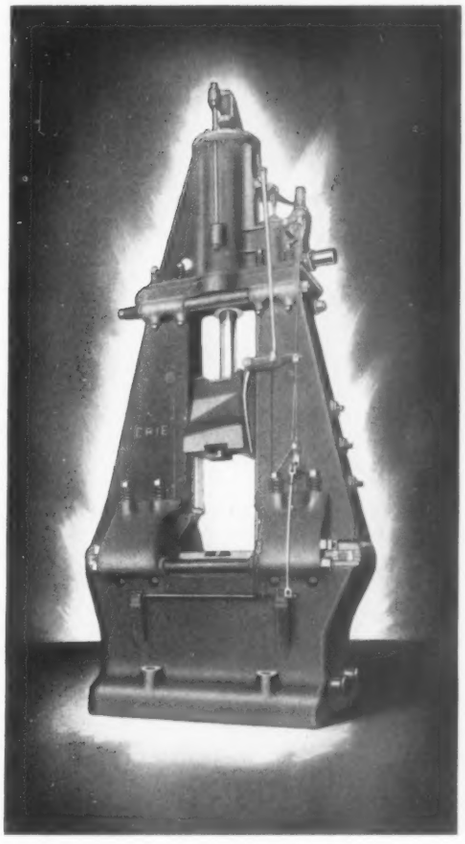
Chicago—Miscellaneous strip demand supports present volume which nevertheless continues to taper as a reflection of slower activity in the automotive industry. New buying apparently is against actual needs as they develop. Consumers' stocks are light. Prices hold firm.

Boston—Cold-rolled strip buying is spotty and less active. Automotive parts makers are taking little material and industrial demand in general has declined. There is but slight pressure for lower prices.

Philadelphia—Current specifications are light but June shipments of steel strip may be better than had been expected. Prices are unchanged.

Youngstown, O.—With Youngstown Sheet & Tube Co. turning over its new cold reduction mill at Campbell works, likely to go into production by the latter part of this month, and with Republic Steel Corp. having let contracts for electrical equipment

You Pay for What You Need whether you get it or not.



We don't want to sell you a hammer *unless you need it*. We know that there are hundreds of forge shops where new hammers *are* needed, but where the purchase is being put off under the false notion that it is economy to run the old machines. Is your shop one of these?

If you need new hammers you are paying for them, in high operating costs and high maintenance expense, in low production and costly delays and loss of business. And after you have paid, you have nothing to show for your money.

Since you are going to spend that money anyhow why not put it into a permanent investment in modern ERIE hammers, that will earn dividends for you, year after year?

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ERIE

for its proposed cold-rolling mill at Warren, O., the valley district is in a fair way to become a more important factor in wider strip manufacture. Current volume of specifications is keeping mills operating at fairly satisfactory rates.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 63

Unexpired long term contracts on bolts and nuts still prevent full application of the 70-10-5 off discount which has been in effect for second quarter. Current specifications for bolts, nuts, and rivets show little change in aggregate from the record of the first three weeks of May. Cornell Contracting Co., New York, low on both alternates for the Manhattan-Weehawken, N. J., river tunnel approach, will purchase a quantity of bolts, depending upon the alternate selected. Several carloads are involved. The market on large rivets is 2.90c, Pittsburgh or Cleveland, 3.00c, Chicago, and on small rivets, 70-5 off list.

★

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EVERYONE remembers you . . . gives you that pleasant little glow of realizing we're glad to have you here, and want you to be comfortable.

Beds are deep and very soft, rooms are bright and pleasantly furnished.

The food at Hotel Cleveland is famous. Rare delicacies that remind you of France, or simple dishes prepared in the home-like way you enjoy them.

In addition to being Cleveland's most modern and comfortable hotel, this is also the most centrally located in the city. Hotel Cleveland is only one step, via covered passage, from your train, and two steps from anywhere you'll want to go in the city.

HOTEL CLEVELAND *Cleveland*

Rooms from $2.50 for one, $4 for two.

Wire

Wire Prices, Page 63

Pittsburgh—Manufacturers of wire spring specialties, bolts and nuts, and other products are still consistent in hand-to-mouth buying policies. Some automotive activity on early 1936 parts is beginning to appear and revised wire specifications are in the market from these sources. On a Pittsburgh base, plain manufacturers' wire is quoted 2.30c, spring wire 2.90c, and nails $2.60.

Cleveland — Demand for farm fencing material, particularly barb wire, is strong and this is the only department in the wire business that is not less active than last month. Manufacturers withdrew from the market after the NRA decision, but recently have been doing more buying, as prices have remained steady.

Chicago — Some jobbers in the South are reported to have canceled agreements on merchant wire products, apparently reflecting the influx of foreign-produced material. While mill sales are tapering, the decline has been less than anticipated.

Boston—Wire orders are off slightly. Manufacturers' wire is holding fairly well, although there has been some drop in demand for automotive needs and specialties. The price factor is less important with few buyers pressing for concessions.

Youngstown, O. — Demand for fence and barbed wire having slackened miscellaneous requirements continue to supply most mill shipments of wire products currently. Caution of buyers previously in restricting commitments for manufacturers' wire to immediate needs appears to be wearing off.

Metallurgical Coke

Coke Prices, Page 63

Postponement of the general strike in the soft coal industry finds consumers well stocked with coal and coke. Because of this condition there has been a sharp falling off in fuel demand and prices are entirely nominal. Furnace coke remains quoted from $3.40 to $3.60 per ton, with domestic sizes around $3.50. Foundry coke, common grades, remains $4.60 per ton, Connellsville, Pa., ovens, and premium foundry coke, $5.10 to $5.35.

Shipments of by-product foundry coke at Chicago are holding up well and no change in prices is expected for July. Cincinnati sellers find specifications are holding at a steady rate. Birmingham, Ala., producers are maintaining volume and prices.

Shapes

Structural Shape Prices, Page 62

New York—Structural awards at approximately 10,000 tons are the heaviest in weeks, 6200 tons being for the steel superstructure, Henry Hudson bridge to the American Bridge Co., Pittsburgh. Low bid on 2058 tons of carbon structural steel included in the Hudson river tunnel and plaza was 4.4c per pound in place, while the low bid on silicon steel was 5.25c, there being 173 tons of the latter. Cornell Contracting Co., New York, was awarded the contract.

Preliminary reports received by the American Institute of Steel Construction indicate bookings of fabricated structural steel in May were approximately one-half what they were for the same month last year. Shipments were approximately 28 per cent less than for May last year, and the backlog of the industry is about 30 per cent less than a year ago.

Philadelphia — For the addition to the Library of Congress, Washington, 9000 tons of structural shapes are reported placed with the McClintic-Marshall Corp., Bethlehem, Pa. The shelving for the building will require over 3000 tons of sheets, bars and small angles and may be fabricated by a Jersey City, N. J. company. Other structural tonnages here are light.

Pittsburgh — Formal contract award is expected shortly by the St. Charles Bridge Co., a subsidiary of the Wabash railroad, on 10,000 tons of structural shapes for a Mississippi river bridge at St. Charles, Mo. The low bidders are jointly American Bridge Co., Pittsburgh, and Mt. Vernon Bridge Co., Mt. Vernon, O., the former bidding the approaches, and Mt. Vernon company the river span. About 750 tons of structural steel for the Liberty tubes toll plaza, Pittsburgh, will likely be readvertised as the low bid by John F. Casey Co., Pittsburgh, $1,157,635.80, has been rejected.

Plain structural shapes are firmly quoted 1.80c, base, Pittsburgh, but a weakness persists in fabricated prices. The market on steel sheet piling continues 2.15c, base Pittsburgh, and certain price weaknesses recently reported have been in lump sum bids where other materials are involved.

Cleveland—Awards were larger, aggregating about 2000 tons, including 850 tons of piling for the Main street bridge, Columbus, O.; 750 tons of shapes for the Greer Steel Co.'s plant at Anderson, Ind., and several smaller lots. Bids on 170 tons of piling for a Muskingum, O., conservancy district project at Fair Oaks, O., were so close that the award was made to a Pittsburgh fabricator by drawing from a hat. Plain material prices are firm.

Chicago—Bids go in July 23 with the United States engineer at St. Paul on approximately 1100 tons of shapes and 1500 tons of piling for lock No. 3 on the Mississippi river at Red Wing, Minn. Other Mississippi river lock and dam projects are expected to come out thereafter in rapid succession. The Illinois highway improvement program, for which government funds have been allotted, may result in considerable steel tonnage. As many as 200 overhead crossings may be constructed. A few private jobs are noted currently, both awarded and pending.

Boston—Structural steel requirements are light, with buying limited to small lots. Included among contracts placed are 310 tons for a state bridge, Maine, to be fabricated by a Pennsylvania shop. Structural fabricators in New England, with one or two exceptions, have slim backlogs, and none has much business on the books. While plain material is steady, fabricated prices are showing a wider spread in competitive bidding.

San Francisco—Structural shape awards were the lightest of any week this year, less than 700 tons being booked. To date, 44,517 tons have been placed, compared with 59,020 tons in the corresponding period in 1934. No new inquiries of size have developed recently.

Seattle—Structural shapes continue to lead steel demand in the Pacific Northwest. One of the year's largest awards, 8000 tons went to the American Bridge Co., Pittsburgh, for a construction trestle over the Columbia river at Coluee, Wash. The contract was let by the Mason, Walsh, Atkinson, Kier Co., the general contractors. Bids for approximately 6300 tons for cranes, trestles and distribution system at the Bonneville, Oreg., dam have been postponed from June 25 to July 9.

Shape Awards Compared

	Tons
Week ended June 22	**32,891**
Week ended June 15	**6,255**
Week ended June 8	**5,406**
This week, 1934	**23,757**
Weekly average, 1934	**16,284**
Weekly average, 1935	**14,636**
Weekly average, May	**11,525**
Total to date, 1934	**446,332**
Total to date, 1935	**365,924**

The Alcova, Wyo., dam project, bids at Casper, Wyo., July 15, involves 878 tons of steel.

Shape Contracts Placed

9000 tons, addition, Library of Congress, Washington, to McClintic-Marshall Corp., Bethlehem, Pa.; Consolidated Engineering Co., Baltimore, general contractor.

8000 tons, construction trestle, Coulee, Wash., dam, to American Bridge Co., Pittsburgh.

6200 tons, superstructure, Henry Hudson bridge, Spuyten Duyvil, Bronx, New York, to American Bridge Co., Pittsburgh, $865,208.59. Contract also includes 47 tons of miscellaneous iron and steel, and 195 tons of reinforcing.

1850 tons, Westchester county home, Eastview, N. Y., to Bethlehem Fabricators Inc., Bethlehem, Pa.; through Will Crow Construction Co.

850 tons, piling, Main street bridge, Columbus, O., to unstated fabricator.

750 tons, plant at Anderson, Ind., for Greer Steel Co., Dover, O., to Burger Iron Co., Akron, O.

600 tons, overhead crossing, Glenview, Ill., for Chicago, Minneapolis, St. Paul & Pacific railroad, to American Bridge Co., Pittsburgh.

500 tons, passenger station, New York Central railroad, Syracuse, N. Y., to McClintic-Marshall Corp., Bethlehem, Pa.; W. M. Ballard Inc., Syracuse, general contractor.

460 tons, miscellaneous steel, division "A," southwest sewage works, Chicago; 255 tons to Duffin Iron Co., Chicago; 105 tons, Inland Steel Co., Chicago.

400 tons, bridge, Lawrenceville, Ind., to McClintic-Marshall Corp., Bethlehem Pa.

350 tons, industrial building, for Joslyn Mfg. Co., Ft. Wayne, Ind., to Joseph T. Ryerson & Son Inc., Chicago; Abel Howe Co., Chicago, general contractor.

210 tons, memorial building, West Chester, Pa., to Lehigh Structural Steel Co., Allentown, Pa.

310 tons, state highway bridge over Maine Central railroad, Millikens Crossing, Me., to American Bridge Co., Pittsburgh.

300 tons, beef killing plant for Armour & Co., Chicago, to Hansell-Elcock Co., Chicago.

300 tons, four buildings, Atlantic Wire Co., Branford, Conn., to McClintic-Marshall Corp., Bethlehem, Pa.; Leo F. Caproni, New Haven, Conn., engineer in charge of construction. Kalman Steel Corp., Bethlehem, Pa., furnishing 25 tons of reinforcing bars.

285 tons, highway bridge NRH-66, Florence, Ala., to Virginia Bridge & Iron Co., Roanoke, Va.

285 tons, warehouse and docks, Panama City, Fla., to Stupp Bros. Bridge & Iron Co., St. Louis.

250 tons, foundry, Magnus Co. Inc., Los Angeles, to Pacific Iron & Steel Co., Los Angeles.

240 tons, chlorine building, Monsanto, Ill., to Stupp Bros. Bridge & Iron Co., St. Louis.

225 tons, building 49, Celanese Corp. of America, Cumberland, Md., to Belmont Iron Works, Philadelphia.

170 tons, state highway bridge, Yazoo,

Miss., to Nashville Bridge Co., Nashville, Tenn.

170 tons, sheet piling and bearing piling, Muskingum, Ohio, conservancy district project at Fair Oaks, O., to Jones & Laughlin Steel Corp., Pittsburgh.

165 tons, tunnel ribs for metropolitan water district, Los Angeles, to Commercial Shearing & Stamping Co., Youngstown, O.

141 tons, warehouse, Libby-Owens, Ford Glass Co., Toledo, O., to Fort Pitt Bridge Works, Pittsburgh.

125 tons, auditorium and gymnasium, Hiram college, Hiram, O., to Jones Bros., Ravenna, O.

125 tons, miscellaneous structural work, Lehigh Navigation Co., Tamaqua, Pa., to Bethlehem Construction Co., Bethlehem, Pa.

125 tons, building No. 7, Pilgrim hospital, Brentwood, N. Y., to Lehigh Structural Steel Co., Allentown, Pa.; through Caye Construction Co.

105 tons, factory, California Fruit Wrapping Mills Inc., Pomona, Calif., to Pacific Iron & Steel Co., Los Angeles.

100 tons, shapes and bars, addition, Raybestos-Manhattan Inc., Stratfield, Conn., to American Bridge Co., Pittsburgh, and Hunter & Havens, Bridgeport; Edwin Moss & Son Inc., Bridgeport, general contractor.

100 tons, assembly hall, Credemore hospital, Brooklyn, N. Y., to Belmont Iron Works, Philadelphia; through Edward Corning Co.

100 tons, building, Waiakea Mill Co., Hawaii, to Virginia Bridge & Iron Co., Roanoke, Va.

100 tons, building alterations, Acme Packing Co., Brooklyn, N. Y., to Belmont Iron Works, Philadelphia; through Barney Ahlers Co.

Shape Contracts Pending

20,000 tons, department of interior building, Washington; bids July 16.

10,000 tons, Mississippi river bridge for St. Charles Bridge Co., subsidiary of Wabash railroad; American Bridge Co., Pittsburgh, and Mount Vernon Bridge Co., Mount Vernon, O., jointly low, the former on the approaches and the latter on the span.

6300 tons, stoplogs, gates, cranes, etc., Bonneville, Oreg., dam project; bids to United States engineer, Portland, Oreg., postponed from June 25 to July 9.

1800 tons, Mississippi river lock No. 13 Clinton, Iowa. Includes 1250 tons of piling and 100 tons of miscellaneous material.

1500 tons, shapes, plates and bars, third quarter estimated requirements, Norfolk & Western railroad, Roanoke, Va.; bids June 26.

3245 tons, comprised of 5,770,000 pounds of structural steel, reinforcing bars, and dam operating machinery, and 720,000 pounds of steel piling, Winfield dam, Kanawha river, Huntington, W. Va., engineers drawing plans with bids expected to be opened about July 15. Dam will be of the roller-gate type consisting of five standard and one crest-flap type roller gates.

2000 tons, dental college, New Orleans, La.; Jones & Laughlin Steel Corp., low bidder.

1050 tons, Mississippi river lock No. 3 at Red Wing, Minn., includes 50 tons of piling and a small tonnage of forgings and castings; bids July 23.

1000 tons, bridge for Nickel Plate railroad, Cleveland, at Ohio-Pennsylvania state line; bids June 28.

878 tons, Alcova, Wyo., dam project; bids to bureau of reclamation Casper, Wyo., July 15.

530 tons, Rialto building, Times Square, New York.

500 tons, four roller gates, 75 x 23 feet, Imperial dam desilting work for All-American Canal System, Yuma, Ariz.; bids July 8.

500 tons, office building, Liquid Carbonic Corp., Chicago. Plans revised.

440 tons, Pennsylvania railroad docks, Erie, Pa.; Rust Engineering Co., Pittsburgh, general contractor.

400 tons, five Baltimore & Ohio railroad bridges, various locations.

400 tons, bridge, Stuart, Fla., for Florida East Coast railroad.

250 tons, bridge, Athens, Ala.

200 tons bridge, West Seneca, Erie county, New York.

200 tons, tennis court building, Wayne county, Mich. (Detroit) for Grosse Point tennis house.

200 tons, theater, Washington, for Parkwood Training Co.

170 tons, postoffice, Peterboro, Va.

160 tons, Darling apartment hotel, Wilmington, Del.

125 tons, high school gymnasium at Pekin, Ill.

Behind the Scenes with STEEL

Saving Feature

"Four out of five have it"—that fits STEEL's renewal percentage perfectly. There are always a few who discontinue for one reason or another.

Considering the nice way most of them part company, however, we're rather glad to see one every so often. Just note the finesse F. W. F. uses:

We will have to ask that you discontinue STEEL *to us for the present. We have enjoyed reading your magazine very much and will be back with you again just as soon as we can see our way clear.*

It just isn't humanly possible to get peeved over a thing like that.

* * *

New Deal Mathematics

This little problem in arithmetic has been going the rounds but don't stop us, even if you've seen it:

125,000,000	Population of U. S.
50,000,000	Eligible to pensions under Townsend and other bonus plans.
75,000,000	
22,000,000	On relief rolls.
53,000,000	
4,000,000	On government payroll.
49,000,000	
48,999,998	Children, cripples, feeble minded, etc.
2	

That leaves just two of us (you 'n' me) to carry on the nation's business. Help!

* * *

Haitch

It seems one of our typographers has been having a little trouble with silent "haitches." He has been studying up at home and thought he had everything straight.

Then one day he was setting a head for page 43 of the May 20 issue. The upshot was a neat "H" stuck in "WorcHester." You'll have to excuse us middle westerners, but those Yankee words are just a little too much for us.

* * *

Boosters

One of the things that leads us to believe STEEL is a pretty decent paper after all, is the way some of our more enthusiastic subscribers sell their friends on subscribing.

Last week we had a letter from the manager of a large agricultural equipment company telling us how he believed his friend H. A. G. would find STEEL as interesting as he does. He had written him and would we kindly send him a sample copy?

That kind of selling beats all the ballyhoo and promotion plans possible.

Did we get the subscription? No, H. A. G. already had one.

* * *

Service For All

The last few weeks show a decided increase in requests for information. This may be, and we hope it is, a sign of improving business.

A sign of activity in a western town was this telegram—"Wire names of five hot-dip galvanizing experts at once!" Another enterprising individual wanted to know who could furnish stainless steel for dental use. "What is Ferrodur?" "What is Magnalite?" etc., etc., were others.

If you have never tried us as a source of information, make a mental note of the fact that we are literally begging to help you out.

* * *

Up

You still hear grumbles of depression and about how people are getting tired of waiting for the "corner."

It is probably just the same as not being able to appreciate another person's aches and pains, because here STEEL is all smiles and even forgetting how to spell depression.

The reason is obvious of course. The first third of this year shows STEEL to have had a 30% increase in advertising space, which is *something!*

* * *

Intensive Reading

Various check-ups we have made show an average of five readers for every copy of STEEL—in some cases many more.

To make it as convenient as possible to pass STEEL to the various men in your organization who should be reading it, we furnish special routing slips to be attached to each issue. If you are not using our service, or one of your own, send your list of names to us; in care of the Readers' Service Dept. The slips will be prepared for you free of charge. Fair enough?

—SHEPLU

Reinforcing

Reinforcing Bar Prices, Page 63

Pittsburgh—Low bid of $1,157,635.80 by John F. Casey Co., Pittsburgh, for construction of the Liberty tubes toll plaza, Pittsburgh, has been rejected by the Allegheny authority board, thus delaying about 800 to 1000 tons of reinforcing steel bars. Bids will be taken about July 15 by the Huntington, W. Va., engineers on a large tonnage of reinforcing bars for the Winfield, W. Va., dam on the Kanawha river, to be a roller-gate type. In all 2885 tons of rolled steel, including bars and shapes, will be required. The market is firm at 2.05c, base, Pittsburgh, for new billet bars in cut lengths, carload quantities, and 1.95c, Pittsburgh, is generally quoted on rail steel bars.

Cleveland—Award of 1000 tons of reinforcing bars for the Cedar-Central government housing project here to Truscon Steel Co., Youngstown, O., features the market. The same interest booked 65 tons of window sash for the project. Announcement of the placing of 250 tons of steel lintels also is expected momentarily. Bids have been submitted on several thousand tons of bars for Muskingum, Ohio, conservancy district dams and bridges, and purchases will be made soon. The volume of small-lot, miscellaneous business is light.

Chicago—Two Mississippi river locks which now are approaching the construction stage will take about 1350 tons of reinforcing bars. Additional tonnage is looked for from other Mississippi lock and dam projects shortly. The Illinois road-building program also will result in some tonnage.

Philadelphia—Reinforcing bar demand still is quiet. Some public work is expected out shortly at Reading, Pa.

New York — Contractors are slow to place reinforcing steel. Thus far quotations on billet bars are firm. New volume is light, with several thousand tons pending. On close to 1400 tons required for the Manhattan-Weehawken, N. J. tunnel, New York approach, the low bid was 3.5c for reinforcing rods in place.

San Francisco — Reinforcing bar awards during the week were all limited to lots of less than 100 tons. New bids will be taken on July 11 for 463 tons for the Fresno, Calif., auditorium. Original bids on this structure were rejected in February. Approximately 450 tons of shapes also are required.

Seattle — Bureau of reclamation has called for bids to be opened July 15 at Casper, Wyo. for the Alcova, Wyo., dam which requires 1100 tons of reinforcing, this being the largest concrete bar project pending. No call has yet been issued for approximately 12,000 tons required for the Coulee, Wash., dam. Reinforcing specifications are few and of small importance.

Concrete Awards Compared

	Tons
Week ended June 22	1,990
Week ended June 15	2,634
Week ended June 8	4,742
This week in 1934	2,485
Weekly average, 1934	4,084
Weekly average, 1935	4,762
Weekly average, May	3,837
Total to date, 1934	127,006
Total to date, 1935	119,054

Reinforcing Steel Awards

1000 tons, Cedar-Central government housing project, Cleveland, to Truscon Steel Co., Youngstown, O. Also, 65 tons of window sash to same interest. George A. Fuller Co., Wash-

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Step off your train, walk across Grand Central Station—and right into the Commodore. Before you know it you'll be relaxing in a bright, airy, outside room with every modern convenience—thanking your stars for such smooth and ready comfort. In the heart of New York's greatest business zone, with other areas quickly reached by express subway from lower lobby. Courteous efficient service. Famous meals at attractive prices.

Large, comfortable, outside rooms—all with bath—from $3

THE COMMODORE

RIGHT AT GRAND CENTRAL, NEW YORK

Frank J. Crohan, President

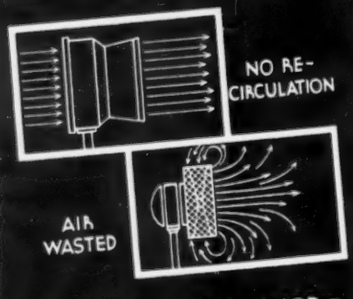
SAVE YOUR MEN

KEEP THEIR SUMMER-TIME EFFICIENCY

100% instead of 10%*

COPPUS HEAT KILLERS

are the only type which directs the air onto the job



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ington, general contractor.

500 tons, Allegheny county home, Woodville, Pa., to Jones & Laughlin Steel Corp., Pittsburgh, through W. F. Trimble & Sons Co., Pittsburgh; Metzger-Richardson Co., Century building, Pittsburgh, engineers.

250 tons, addition to high school, Van Nuys, Calif., to unnamed interest.

140 tons, Washington state bridges, to Pacific Coast Steel Corp., and Northwest Steel Rolling Mills, Seattle.

100 tons, building, General Ice Cream Co., Syracuse, N. Y., to Kalman Steel Corp., Bethlehem, Pa.

Reinforcing Steel Pending

1100 tons, Alcova, Wyo., dam project; bids to bureau of reclamation, Casper, Wyo., July 15.

900 tons, Liberty tubes plaza, Pittsburgh; John F. Casey Co., Pittsburgh, general contract bid of $1,157,635.80 rejected by Allegheny county authority.

750 tons, Mississippi river lock No. 3, Red Wing, Minn.; bids July 23.

600 tons, Mississippi river lock No. 13, Clinton, Iowa.

580 tons, Henry Hudson bridge, Bronx, New York; 195 tons for superstructure, American Bridge Co., Pittsburgh, contractor; 385 tons for substructure, Thomas Crimmins Contracting Co., New York, contractor, at $272,668.50. Also 42 tons of miscellaneous steel required for substructure.

500 tons, estimated, involved in 2,117,650 pounds of reinforcing steel and structural steel and 6714 feet of reinforcing concrete culvert pipe, relocation of part of the Grafton and Belington branch of the Baltimore & Ohio railroad to permit construction of the Tygarts river reservoir dam; bids to Pittsburgh engineers' office, Pittsburgh, in near future. This contract includes construction of one plate-girder deck bridge of 12 spans, each 100 feet in length, and six 100-foot spans.

463 tons, auditorium, Fresno, Calif.; new bids July 11.

250 tons, addition to Lafayette high school, Los Angeles; bids rejected.

100 tons, Washington state highway project; bids June 25.

100 tons, Ballard trunk sewer project, Seattle; bids in.

Unstated tonnage, substructure, bridge, Millikens Crossing, Hallowell, Me., Hector J. Cyr Co. Inc., Waterville, Me., general contractor, $75,334.50, American Bridge Co., Pittsburgh, awarded 310-ton steel superstructure at $25,311, bids June 11.

Pig Iron

Pig Iron Prices, Page 64

Pittsburgh—A rising market for No. 1 cupola scrap shortly may have some reflection in an increased pig iron percentage in the melt of some local foundries. Melters here have paid as high as $13.50 for prompt shipment of No. 1 cupola cast the past week, a price now closely approaching the pig iron market. Foundries are buying on the basis of $18.50, Pittsburgh furnace base, for foundry grades of pig iron, with basic quoted $18 per ton, and bessemer $19.

Cleveland—While demand for pig iron is in lighter volume than a month ago, the market has some fairly encouraging features, and during the week about 3000 tons of merchant iron was booked, including one lot of 500 tons for a maker of automobile and agricultural implement castings. Activity in the oil equipment industry is more pronounced, and makers of heating apparatus report improvement. Some good tonnage purchases in the automotive industry are expected in July. Prices are steady.

Chicago—At least one charcoal iron producer is considering a price advance of 50 cents to $1 a ton due to higher costs. The spread between this grade and malleable iron now is only $2.50, against a normal spread of around $5. No rise in other pig iron grades is impending although the last freight rate increase sent costs about 50 cents a ton higher. Shipments continue to decline, although at a slow rate. New buying is held to immediate needs. Some automotive foundries expect to get under way July 15 on parts for 1936 cars.

Boston—Except for 650 tons sold to two consumers, General Electric Co., Lynn, Mass., and Rice, Barton & Fales, Worcester, Mass., pig iron sales are small. Prices for domestic iron are steady with the 38-cent differential prevailing for southern material. Foreign iron in storage continues to move under domestic prices.

New York—Machine tool builders and manufacturers of building hardware appear to be the principal buyers of pig iron at this time, with business generally coming out better than expected at the beginning of the month. Some sellers believe shipments in June will exceed those for May. Prices are steady. Indications are that the Troy, N. Y., furnace will not go in blast for some time. A few weeks ago it was officially announced that operations would probably be resumed July 1.

Buffalo—Reopening of the long idle North Tonawanda plant of the American Radiator Co. is understood to be planned for about Aug. 1. Large shipments to various works of the company have greatly reduced stocks of iron.

Youngstown, O.—A recently lighted merchant blast furnace in this district has accumulated a fair-sized backlog, upon which it is beginning to make shipments. Generally, however, new business continues desultory, with bulk tonnage going as hot metal to adjoining ingot mold shops.

Cincinnati—Buying of pig iron is chiefly in small lots with a modest decline in weekly tonnages shipped.

Underlying strength to the market sentiment is provided by the numerous inquiries and sales for spot shipment, reports of only slight recessions in some stove foundries, and some improvement in machine tools.

St Louis—General belief that no change will be made in the price of pig iron has stirred some interest in third quarter supplies. Consumers have been drawing heavily on their inventories, and for the most part reserves are not heavy, and as a whole the melt is holding up fairly well. June shipments to date, while below those of the preceding month, are in greater than expected volume. Specifications on malleable have been particularly good.

Birmingham, Ala.—Pig iron consumers are buying in small lots and not as frequently as was noted a month or so ago. Five blast furnaces are active, on foundry iron.

Toronto, Ont.—Local blast furnace representatives state melters are taking iron as demands dictate with the bulk of sales in single car lots. Daily melt is holding around 45 per cent. Imports of pig iron are light with little or no competition from United States producers and only small tonnages coming in from Great Britain. Prices are firm.

Scrap

Scrap Prices, Page 65

Pittsburgh—Still lacking test, steel and iron scrap has slowed down. Even considering the present quiet, brokers are having difficulty covering against their short position, as tightness characterizes secondary holders of scrap. Most mills here are taking scrap off stock piles, preferring to cut down inventories, and it is evident that a resumption in buying interest would cause a quick turn upward in prices. A leading district independent mill last week suspended all shipments against its recent buying orders on scrap rails. Demand for malleable scrap and No. 1 cupola cast finds the latter quotably higher at $13.00 to $13.50, based on sales.

Carnegie Steel Co. is closing bids at Pittsburgh, June 24, on the sale of 3000 tons of 3.25 to 3.75 per cent nickel steel scrap. Based on the present market of about $12, Pittsburgh, for No. 1 heavy melting steel, the price of the nickel scrap should figure about $26 to $27 per ton, calculating on a scrap nickel price of $4 per unit.

Cleveland—Sales of scrap are confined to small lots but shipments to outside points keep up well and Youngstown, O., melters have partially lifted restrictions. Prices are strong, without change.

Boston—Buying for export tends to hold scrap prices. Shippers are paying $8.50 and $7.50, dock, for heavy melting steel grades and in some instances these quotations are bettered 25 cents per ton. Domestic buying is light. New England steel mills are buying only at their own prices with indications of lower open-hearth operations shortly.

Chicago—Scrap quotations are largely nominal, due to general lack of buying. Stocks on hand are ample to cover requirements over the near future at currently lower operating rates. Despite the decline last week, prices appear relatively stable. Dealers are reluctant to dispose of material at current levels and brokers are encountering difficulty in covering on No. 1 steel contracts at less than $9.75. Chicago, Milwaukee, St. Paul & Pacific closes Tuesday on about 5000 tons.

New York—Weakness has developed in machine turnings but heavy melting steel scrap is unchanged, most buying being against export con-

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tracts. New export business is off slightly.

Philadelphia—Domestic trading in scrap is dull and foreign demand is markedly easier although local wharf prices offered by dealers on contracts are unchanged. Prices are unchanged except for a few adjustments.

Baltimore — Washington, Baltimore & Annapolis Electric Railroad Co., 100 South Howard street, Baltimore, in receivership, has been sold in four sections, scrap dealers bidding highest for three sections. The road operates 73 miles and has 82 freight, 144 passenger and three bus cars. Hyman-Michaels Co., Chicago, bid $139,000 for the main line, Baltimore to Washington; Nathan Block & Son, Norfolk, Va., $33,700 for the Shipley-Baltimore division and Continental Iron & Steel Co., New York, $58,500 for the Annapolis-Fort George, Md., division.

Youngstown, O.—Releases are being issued gradually by important scrap consumers as accumulated stores are being consumed but aside from such shipments, the market is quiet. Quotations are unchanged.

Buffalo—Nominally scrap is a trifle weaker due to reduced offers of consumers but under the surface dealers profess to see a strong situation. They hope for advancing prices and are holding material. The last local offer to buy was at $10.75 for No. 1 heavy melting steel but no tonnage moved at this price. Other materials are quiet but occasional cars are being sold at prices confirming the nominal list.

Cincinnati—Lack of mill purchasing, and a sideline position by dealers have aggravated weakness in the iron and steel scrap market. Prices are nominally unchanged. Bids on railroad scrap, for delivery in this district, were lower than in May. Activity is restricted to coverage on contracts.

Detroit—While the iron and steel scrap market continues soft, the fact that automobile manufacturers are offering less material as their schedules taper off is a mitigating circumstance. Buyers, meanwhile, remain aloof from the market. Ford is throwing down less scrap. Water shipments continue light. Hydraulic compressed sheets are reduced 25 cents to $8.25 to $8.75. Borings and turnings are off 25 to 50 cents.

St. Louis—The market for iron and steel scrap is virtually at a standstill. The industries are purchasing next to nothing, and dealers' contracts have been largely cleaned up. With offerings light and no distress scrap, prices are steady. In most instances quotations are nominal, due to absence of transactions upon which to predicate actual values.

Birmingham, Ala. — Buying of steel and iron scrap is in small lots and prices are steady. Dealers have large stocks but smaller users are carrying little on yards.

Seattle—The export scrap market is inactive, a reaction to heavy purchases by Japanese earlier in the year. The Oriental market is overstocked and lacks immediate interest in offers from this side. Prices generally are $1 down from recent highs.

Toronto, Ont.—Dealers report improvement in sales. Demand is mainly for steel grades and substantial shipments of heavy melting steel have been made to the Hamilton, Ont., district. Montreal dealers also report good demand for steel scrap, shipments going forward to England.

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Warehouse

Warehouse Prices, Page 66

Pittsburgh—Prices on steel for resale are firm and without quotable change. However, volume of buying is less and June bookings by jobbers will be under the total of May.

Cleveland—Warehouse sales are in lighter volume, with tonnage considerably below the May average. Prices are unchanged.

Chicago — Steel sales from warehouses still are fair. Aggregate volume is close to the like period of May and is 5 to 10 per cent ahead of a year ago. No change is reported in prices.

Philadelphia—Selling by warehouses is off 10 to 15 per cent so far this month, with no early improvement indicated. Prices are steady.

Detroit—Warehouse business in iron and steel last week was on a somewhat better basis than in the early part of June. Prices are steady.

Cincinnati—Buying of steel from jobbers is lighter than last month but so far has not shown an abrupt decline. Prices are unchanged and steady.

St. Louis—Business at iron and steel warehouses during the first half of June was about on a parity with the volume for that period in May.

Seattle—Public works projects are calling for miscellaneous steel warehouse items but the lack of buying by the lumber industry is reflected in smaller volume.

Cold Finished

Cold Finished Prices, Page 63

Pittsburgh—On cold-finished steel bar purchases through last week, buyers were still paying the full

1.95c, Pittsburgh, base plus all extras, no weakness being apparent. New cold-drawn bar specifications are being issued by several automotive hardware makers for the new 1936 models. Spark plug manufacturers are still active but, generally speaking, cold-drawn bar specifications show a downward trend.

Iron Ore

Iron Ore Prices, Page 65

Cleveland—Lake Superior iron ore shipments this month show little gain over May. Judging from the record in the first three months the industry will not attain to its expected 30,000,000 tons this year, although there is an undercurrent of favorable sentiment in the market, and September should develop considerable improvement.

The lake shipments so far this month are at a rate indicating a total of 3,700,000, about 200,000 tons more than in May. This means an aggregate of approximately 7,600,000 tons for the season to July 1.

On June 15 last year, a year in which the lake shipments totaled 22,000,000 tons, 154 vessels were engaged in the ore trade. June 15 this year the number was only 141, or 21 more than on May 15.

Stocks at lower lake ports and furnaces June 1 totaled 25,324,575 tons, compared with 25,556,502 tons a year ago. The Lake Superior Iron Ore association reports:

	Tons
Consumed in April	*2,360,002
Consumed in May	2,466,585
Increase in May	106,583
Consumed in May, 1934	2,957,934
On hand at furnaces June 1, 1935	21,202,734
On Lake Erie docks June 1, 1935	4,121,841
Total on hand at furnaces and Lake Erie docks June 1,1935	25,324,575
Total June 1, 1934	25,556,502

*Revised.

Despite continued threats by labor organizers, miners failed to strike last week, this being the second time this season when the organizers set a date for them to walkout and they continued at work.

Semifinished

Semifinished Prices, Page 63

Nonintegrated sheet and tin bar producers are still following a cautious policy regarding inventories of semifinished steel. Their mill stocks do not average more than a few weeks' rolling. Wire rod buying is steady, and the $38, Pittsburgh, base for common wire rods is firm. Billets remain $27, and sheet bars, $28, Pittsburgh. The $5 a ton differential for forging quality billets, making that market $32, is firm.

Ferroalloys

Ferroalloy Prices, Page 64

New York—Third quarter contracting is now getting under way in the ferromanganese and spiegeleisen markets. Prices are unchanged for this period. Ferromanganese is $85, duty paid, Atlantic and Gulf Ports, and domestic spiegeleisen, 19 to 21 per cent, $26, Palmerton, Pa., on quantities up to 50 tons, with the usual $2 differential under this figure on quantities of 50 tons and over.

Steel in Europe

Foreign Steel Prices, Page 66

London — (*By Radio*) — Foreign trade in steel and iron in Great Britain increased in May over April. Imports made a gain of 23,730 gross tons, from 62,700 tons in April to 86,430 tons in May. Exports rose from 210,900 tons in April to 213,886 tons in May.

Steel and iron trade in general is satisfactory, with the pig iron position strong and prices of basic iron hardening. Restrictions on importation of foreign steel aid domestic producers and mills are busy on semifinished steel. South Durham Steel & Iron Co., West Hartlepool, will install a new semicontinuous sheet bar mill, for which German equipment has been ordered.

Continental markets show a more confident tone. Italy and Japan are buying billets. Belgian makers are reported to have taken a contract for rolling stock for a railroad in China.

Quicksilver

New York—Quicksilver prices are unchanged. Demand is fairly active. Large lots of 50 to 99 virgin flasks, inclusive, are $71.50, a flask; lots of 15 to 24 flasks, inclusive, $72.50; and single flasks to four flasks, inclusive, $73.50.

Nonferrous Metals

Nonferrous Metal Prices, Page 64

New York—Nonferrous metals held generally steady in the past week although demand was dull, ex-

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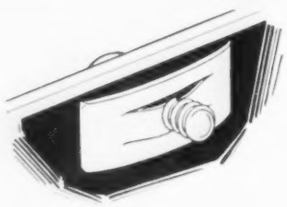

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cept in lead where moderately fair buying was noted from day to day.

Copper—The United States Copper association virtually has replaced the position held by the copper code authority under the NIRA. A meeting was held at the beginning of the week at which it was decided unanimously to co-operate in maintaining existing standards and practices. Producers and custom smelters voluntarily adhered to the old code's regulations regarding sales allocations, price filing and daily sales reports. No price filing actually took place as the market was unchanged at the 9-cent level. Resale copper has been offered down to 8.00c, Connecticut, in the outside market.

Lead—Sales have been moderate to fair, although total tonnage of business done for the week has not been heavy. The price has been steady at 4.00c, New York, with one leading seller maintaining a $2 per ton price differential over the market.

Tin—Straits tin demand has been negligible during the week. Prices, however, have been fairly stable around 51.00c on spot. Futures have also held stable around 50.00c to 50.20c.

Zinc—Prime western zinc has held steady and producers have maintained their prices at 4.30c, East St. Louis. Only occasional carlot sales have been reported from day to day and consumers seem well covered on immediate needs.

Aluminum—Both virgin and remelt aluminum have held unchanged.

Railroad Shops Need New Tools

FIFTY-SEVEN technical papers presented at 27 separate technical sessions, interspersed with special luncheons, lectures, dinners and other features were highlights of the semiannual meeting of the American Society of Mechanical Engineers at Hotel Gibson Cincinnati, last week. Technical sessions started on Wednesday and continued through Friday.

Speaking Wednesday at a meeting sponsored by the railroad and machine shop practice divisions of the society, Alexander Sellers Jr., William Sellers & Co. Inc., Philadelphia, gave his reply to the question: How can railroad shops justify the use of modern machine tools and methods?

That railroad shop equipment needs executive attention without delay is shown by a recent survey cited by Mr. Sellers, in which it was demonstrated that 71 per cent of the machine tools in this field are over 10 years old.

"It is true, of course," said Mr. Sellers, "that many railroads have given serious and sound consideration to maintenance problems and as a result have abandoned isolated shops, combined and consolidated others and transferred and rearranged equipment in order to institute manufacturing methods. Unquestionably, these steps are in the right direction and will gain momentum with time and experience.

"As more is learned about actual costs and as better equipment and more experience with production methods bring about the inevitable improvement of maintenance work performed in the back shops, the result will be the eventual elimination of the engine house for repair work . . . . and the development and expansion of production methods in strategically located shops as the key to lower maintenance costs, whether they refer to locomotives, cars or other equipment.

"Now that maintenance of locomotives and cars constitute such tremendous items of expense, and at a time when railroads are in dire need of profitable operation, it seems appropriate for railroad executives to lay plans for establishing maintenance shops on a sound manufacturing basis and to appoint and support an association of men capable of co-operating with the various railroad departments and manufacturing concerns."

Materials handling, education and training, prefabricated housing, hydraulics, drying, waste elimination, steam power, quality control, lubrication, color, power transmission, fuels, iron and steel, and aeronautics were other subjects covered extensively in papers.

Ralph E. Flanders, president of the A. S. M. E., and president of the Jones & Lamson Machine Co., Springfield, Vt., gave the feature address at a dinner Thursday evening, speaking on the place of the engineer in social progress. On this occasion, the Holley medal for 1934 was awarded to Dr. Irving Langmuir, General Electric Co.

F. N. Speller, National Tube Co., Pittsburgh, well known for his studies on corrosion problems, spoke Friday on the influence of protective layers on the life of metals.

Colonial Iron Co. Repairing Stack, To Be Ready Sept. 1

Colonial Iron Co., Riddlesburg, Pa., started work June 17 on repairs to its blast furnace, preparatory to the resumption of operations at a date yet to be determined. A loan of $110,000, including both federal and private capital, has been obtained for this purpose and for repairs to the company's coal and coke properties.

The furnace, which has been out of

blast several years, will, upon resumption, produce malleable and foundry grades only.

The company has been reorganized, with W. D. Norman, president; E. S. Kochersperger, vice president; and E. M. Story, secretary. Executive headquarters will be at 90 West street, New York.

In addition to Mr. Norman and Mr. Kichersperger, the directorate includes, among others, Lewis P. Ross, one-time vice president of the Empire Steel & Iron Co., and Replogle Steel Co.; Robert C. Lea, former secretary and treasurer of the Robesonia Iron Co.; and Charles M. Smith, one-time president and treasurer of the Colonial Iron Co.

Approximately 125 men will be employed in the repairs, which are scheduled to be completed by Sept. 1; more than 300 will be employed upon resumption of operations at the company's furnace, mines and ovens. The furnace has a capacity of 200 tons daily.

Meetings

PLAIN Washer Manufacturers association will meet June 26 at the Hotel New Yorker, New York. A golf tournament at one of the New York country clubs will be held June 27. The meeting is open to all manufacturers of plain washers whether or not members of the association.

Activities of Steel Users and Makers

AMERICAN Electroplaters' society convention at Bridgeport, Conn., June 12-14, was kept informed on convention matters by *H-VW-M Convention News*, a daily newspaper published by the Harrison-Van Winkle-Munning Co., Matawan, N. J. It was distributed to delegates each morning, containing advance programs, review of preceding day's program, and news notes (see p. 47).

□ □ □

Harmer Steel Products & Supply Co., Portland, Oreg., has moved its warehouse and offices to Southwest First avenue and Pine street. The new location is in the wholesale steel, logging, railway and industrial supply district.

□ □ □

White Motor Co., Cleveland, has re-established its export headquarters at the home office in Cleveland, under Robert L. Boughton, export manager. For two years the Studebaker Export Corp., South Bend, Ind., has handled White overseas business. Previous to that Mr. Boughton held the position to which he has been returned. The export organization will remain unchanged. Both White and Indiana trucks and buses will be handled.

□ □ □

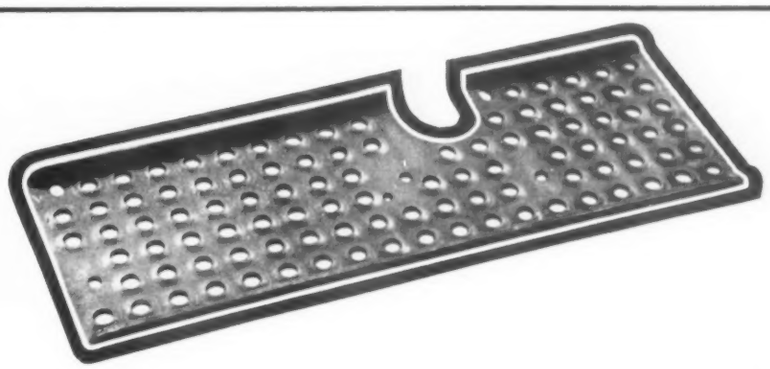
Link-Belt Co., 910 South Michigan avenue, Chicago, has appointed Woodward & McMillen, Aptdo. 1691, Edificio Metropolitana, Havana, Cuba, its exclusive representative for sale of Link-Belt conveying, elevating and power transmitting machinery in Cuba. The firm was organized in 1926, both members having been engaged in merchandising and engineering in Latin America for many years.

Equipment

New York — A general tendency for higher machine tool prices has resulted in advances in some lines of lathes, drills, horizontal boring mills, automatic screw machines and other machine equipment. Buyers of equipment are more prone to place required machinery, resulting in orders covering one to three tools at a time. Some of the larger industrial shops, out of the market for four or five years, have been buying. While no great reaction has followed lapse of NRA, releasees of orders held in abeyance has followed in a few instances. There is a shortage of skilled mechanics in some centers. Few have been trained in the last five years while journeymen during that period have drifted to other fields, which together with a normal depletion of ranks, is beginning to be felt in highly skilled shop crews.

Recent sales of Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y., include: one 150-ton crane to S. Morgan Smith Co., York, Pa.; nine cranes for government navy yards; one 5-ton crane to Elkland Tanning Co., Elkland, Pa.; one 2-ton crane to International Harvester Co., Chicago; one 6½-ton crane and one gantry crane to Revere Copper & Brass Co., New Bedford, Mass., and Rome, N. Y.; one 13-ton hoist for shipment to Spain; one 1¼-ton cupola charging hoist and crane to Werner Foundry Co., Lansdale, Pa.; one 10-ton crane to Wallingford Steel Co., Wallingford, Conn.; and one 5-ton crane to Muncie Products Co., Muncie, Ind.

Pittsburgh — Republic Steel Corp. has placed an order with Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., for motors and control equipment for revisions to a 42-inch reversible cold strip mill at the company's Warren, O., works. American



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Rolling Mill Co., Middletown, O., last week announced it would begin work immediately on construction of a cold reducing mill to be located at the company's East works, Middletown, able to produce cold rolled sheets up to approximately 72-inch widths. F. H. McGraw & Co., New York, has been awarded contract for buildings and foundations. The Mercer, Pa., plant of Elliott-Blair Steel Co., inactive for several years, is being converted into a plant for the manufacture of vaults and caskets. Continental Steel Corp., Kokomo, Ind., recently awarded contracts for revamping of its 19-inch, two-high, six-stand continuous sheet, bar, and billet mill. Jones & Laughlin Steel Corp., Pittsburgh, which has been considering placing a continuous stand on one of its South Side works plate mills, apparently has abandoned the project, at least for the time being.

Chicago—Machine tool and equipment buying continues slow as has been the situation over the past several weeks. Sellers are booking a few orders for individual machines, but industry apparently is not yet inclined to make heavy expenditures for replacement or expansion programs. New inquiry is negligible and little is in sight for the immediate future. Some companies apparently would go ahead with equipment buying but are finding it almost impossible to negotiate bank loans for this purpose. One toolmaker expects to place 5 to 10 per cent price increases in effect shortly.

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Construction and Enterprise

Ohio

CLEVELAND—Sanitary Tinning Co., 3753 East Ninety-third street, is planning to erect a plant addition costing approximately $40,000.

CLEVELAND—Traybon Engineering Corp., Detroit, E. J. Hill president, is planning to move here about July 1, and has leased space in a building at East Fortieth street and Kelly avenue.

CLEVELAND—Harris Calorific Co., 2828 Washington avenue Northwest which is forced to vacate its present factory because the site will be included in the federal slum rehousing project, has started work on a new plant at Cass avenue. The plant will cost upward of $100,000 for building and equipment. (Noted June 17.)

DAYTON, O.—Aetna Paper Co., 115 Columbia street, is considering making power plant alterations and installing new boilers. Estimated cost $28,500.

DRESDEN, O.—PWA loan and grant of $37,500 has been allotted to village for construction of sewerage system.

HUDSON, O.—Village has begun extensive repairs to sewage disposal plant. Cost estimated at $25,000.

FREMONT, O.—Industrial Power Co. has been incorporated by John E. Ziegler, R. A. Hunsinger, A. E. Culbert and C. A. Culbert, to manufacture electrical appliances and air-driven automobiles. A factory will be established here soon.

LANCASTER, O.—Jay E. Altfaber, owner of the Lancaster Iron & Metal Co., has purchased the plant of the Godfrey L. Cabot Co., Cabot, W. Va., and will dismantle the plant.

MIDDLETOWN, O.—American Rolling Mill Co., Calvin Verity vice president, has begun work on construction of a wide cold reducing mill, capable of producing cold reduced sheets up to 72 inches wide, to be located at its East works plant. The cost of the new mill and the necessary revamping of existing plant facilities will be approximately $3,500,000.

Michigan

BATTLE CREEK, MICH. — Rich Mfg. Corp. has been incorporated by George R. Rich, president, to manufacture valves, tappets, cylinder heads.

and household gas meters. A factory building between Flint street and the Michigan Central tracks has been leased, and orders for approximately $40,000 worth of machinery and equipment have been placed. Additional equipment will be purchased as needed.

JACKSON, MICH.—Macklin Co., manufacturer of grinding wheels, has announced a building program which will increase capacity 50 per cent. General contract for additions to the plant between the Wildwood avenue road and the Michigan Central main lines, has been let to North-Moller Co. All departments will be expanded.

PORT HURON, MICH.—Electric Units Inc., manufacturer of electric heaters and appliances, is moving its manufacturing plant from Marine City to a plant on South Military street here. Temporary offices have been established at 317 First National Bank building. Robert J. Waddell is president.

Illinois

POCAHONTAS, ILL.—City is planning to construct a new water supply system. Kinsey Engineering Co., Pekin, Ill., engineer.

ROCK ISLAND, ILL.—United States engineer, Clock Tower building, will take bids June 25 for furnishing and installing 12,000 gallon fuel oil supply tanks with pumps and connections at locks No. 18 above Burlington, Iowa, and No. 21, below Quincy, Ill.

Indiana

BLUFFTON, IND.—Board of public works, F. Buckner mayor, has preliminary plans for sewage disposal plant, costing $130,000.

Pennsylvania

BUTLER, PA.—Inactive plant of the Austin Car Co. here may be reopened, according to plans of R. S. Evans, Atlanta, Ga., and Martin Tow, Buenos Aires, South America, capitalist. It is planned to invest about $300,000 and project the assembly of about 6000 cars during the first year of operation. Settlement of back municipal taxes has been asked by these parties, as well as temporary reduction of the plant's assessed valuation.

MERCER, PA.—Idle plant of Elliott-Blair Steel Co. which has been inactive for several years, has been acquired by A. R. Hodge, Grove City, Pa., heading a new company which plans to convert the plant into a factory for the manufacture of vaults and caskets.

PHILADELPHIA—Pennsylvania railroad will receive bids until June 24 in room 415, 15 North Thirty-second street, on surplus steel cable, steel sheet piling, forms and fittings for concrete work, etc., all surplus material from electrification work.

TARENTUM, PA.—PWA grant of $22,000 to this borough for water filtration plant improvements has been increased to $40,000.

TITUSVILLE, PA.—Fisher & Young, W. S. Young manager, plans rebuilding 1-story saw mill and lumber plant, including new boiler house and installation of new equipment and machinery. Estimated cost $28,500.

Massachusetts

AMESBURY, MASS.—Town, R. H. Hills chairman of selectmen, plans waterworks system. Cost estimated at $100,000. Weston & Sampson, 14 Beacon street, Boston, engineer.

GARDNER, MASS.—Florence Stove Co., School street, plans installation of power equipment in its two new additions to plant. Cost about $70,000.

New York

ALDEN, N. Y.—Village has plans completed for sewage disposal plant, costing approximately $125,000. Awaiting PWA allotment.

HORSEHEADS, N. Y.—Village is preparing plans for municipal electric plant to be operated by diesel engines. Cost $105,000. H. E. Childs, Sayre, Pa., engineer.

JAMESTOWN, N. Y.—Board of public utilities, T. J. McKee secretary, City hall, will take bids late in the summer for installing additional equipment in Steele street plant of municipal light and power system.

Kentucky

LUDLOW, KY.—Pattison Bros. Kentucky Bourbon Distillery, 325 Lafayette

(*Please turn to Page* 85)

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BEATTY MACHINE & MFG. CO., 944-150th St., Hammond, Ind.

(*Continued from Page* 83)

avenue, Cincinnati, is planning to establish a distillery here at a cost of about $28,000.

Alabama

ATMORE, ALA.—William T. McCormick, Pensacola, Fla., has applied for franchise for erection of gas plant and distribution system.

Maryland

FAIRVIEW, MD.—John B. Rodgers and O. K. Townsend have leased a five-acre tract for construction of a shipbuilding and ship repair plant, including marine railway, docks, etc.

District of Columbia

WASHINGTON—Bureau of supplies and accounts, navy department, will take bids July 9, schedule 5362, on turbo-generator sets, switchboards and spare parts, delivered Brooklyn, N. Y., and Philadelphia.

Georgia

ATLANTA, GA.—Jackson Brewing Co., 620 Decatur, New Orleans, is planning to establish a brewery here, costing $1,000,000.

ELBERTON, GA.—Georgia Granite Corp. is planning to rebuild its burned plant. Estimated cost $30,000.

SAVANNAH, GA.—Union Bag & Paper Co., Woolworth building, New York, has awarded the general contract for erection of a $4,000,000 plant here to the Merritt-Chapman & Scott Corp., 17 Battery place, New York. (Noted April 15.)

Louisiana

MONROE, LA.—H. M. James Machine Works, 1611 DeSiard street, has awarded contract to W. H. Blane, West Monroe, La., for erecting a 1-story building, 60 x 165 feet.

WISNER, LA.—Town, R. A. Brown mayor, is planning to install a $40,000 waterworks system. Swanson-McGraw Inc., consulting engineers, Balter building, New Orleans, will submit preliminary report after July 1.

Mississippi

JACKSON, MISS.—I. C. Garber has been awarded contract to erect a factory for a tool handle plant at Poindexter street between Hooker and Lynch streets.

Florida

FORT MYERS, FLA.—S. J. Robinson & Son, Haines City, Fla., has been awarded contract to rebuild burned packing plant for Lee County Packing Co. Building with machinery, loading pier and new seawall will cost $100,000.

MIAMI BEACH, FLA.—City council has tentatively approved proposed power plant for $150,000 office and theater under construction by J. L. Patten, 111 West Jackson street, Chicago, at 555 Lincoln road.

PENSACOLA, FLA.—Goulding Lumber Co. is planning to repair its burned lumber plant at a cost of $35,000.

ST. AUGUSTINE, FLA. — Marine railway and machine shop of Zeigler Bros., 87 Lewis avenue, recently sustained damages by fire.

PORT ORANGE, FLA.—City, B. E. Jones mayor, is considering installing a water system.

North Carolina

ROWLAND, N. C.—Rowland Implement Co. has been incorporated with $25,000 capital, by David Townsend and A. B. Pate.

WILSON, N. C.—Hackney Wagon Co. Inc. has been incorporated with $50,000 capital, by J. N. Hackney and W. D. Adams, and will operate a woodworking plant.

South Carolina

DARLINGTON, S. C.—City will apply for PWA loan of $60,000 for sewer system improvements.

GREELYVILLE, S. C.—City will apply for $35,000 PWA loan for waterworks system.

ST. MATTHEWS, S. C.—City, R. B. Geiger mayor, has applied to PWA for loan and grant of $68,000 for sewage system and two disposal plants.

Tennessee

NASHVILLE, TENN.—City, Hilary E. Howse mayor, will probably begin work in 90 days on building an airport. Cost is estimated at $350,000.

West Virginia

CHARLESTON, W. VA.—Kanawha Valley Power Co. expects to build an aerial transmission line across the Kanawha river. Steel towers will be built at each end of the line.

HUNTINGTON, W. VA.—City, Martin V. Chapman mayor, will call for bids July 15 for a 100-ton incinerator costing $75,000. Plans also are being drawn for erection of a garage building and machine shop.

Virginia

ABINGDON, VA.—City is applying to PWA for $428,000 loan and grant for waterworks system.

NORFOLK, VA.—Equipment of the Southern Shipyard Corp., Newport News, Va., has been purchased by the Norfolk Shipbuilding & Dry Dock Co. Most of the equipment in the Newport News plant will be moved to the Norfolk plant. Included is a marine railway accommodating a vessel of 3500 tons which will be enlarged to accommodate ships of at least 5000 net tons.

RICHMOND, VA.—Dr. W. T. Sanger, president, Medical College of Virginia, will take bids July 2 for erection of central power plant and installation of heating system at the college.

WINCHESTER, VA.—City, Arthur M. Field city manager, has applied to PWA for loan of $532,000 for water supply system.

Missouri

KANSAS CITY, MO.—Tarkio Molasses Feed Mill Co., Livestock Exchange building, is planning to rebuild and enlarge its plant at 1739 Guinotte avenue, and will install machinery. About $175,000 will be expended.

SHREWSBURY, MO. — Frank H. Harty mayor, will receive bids June 25 for a sanitary sewer system, costing $180,000.

WASHINGTON, MO. — Washington Distilleries Inc. has been formed with $150,000 capital, by Emil L. Nieburg and Edmund Zelle.

Oklahoma

OKLAHOMA CITY, OKLA.—Moran Equipment Corp. has been organized by W. P. Moran, 1149 Northwest Thirty-sixth street, and H. F. Moran.

OKLAHOMA CITY, OKLA.—City, T. G. Banks city engineer, has preliminary

(*Please turn to Page* 87)

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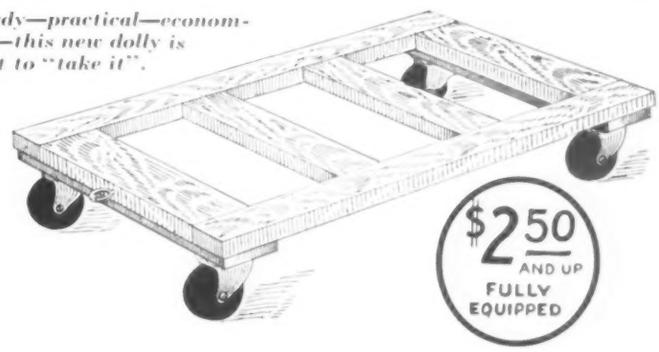

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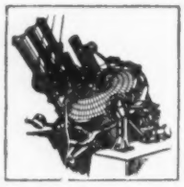

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(Concluded from Page 85)

plans for a 40,000,000-gallon water filtration plant, costing $200,000.

Texas

BUFFALO, TEX.—City, H. H. Parker mayor, is planning to build a $35,000 waterworks and $30,000 sewer plant, and will erect a 100-foot steel tower.

OLNEY, TEX.—Edwin Hill mayor, receives bids July 2 for waterworks improvements, including pump station and distribution system, and elevated tank.

SONORA, TEX.—City, W. C. Gilmore mayor, has preliminary plans in progress for waterworks system estimated to cost $65,000.

Wisconsin

CRANDON, WIS.—W. B. Gamble, president and general manager of a new corporation in process of completion, has plans for a new distillery and auxiliary buildings estimated to cost $50,000.

MADISON, WIS.—Bids will be asked soon for furnishing city water department with two 4,000,000-gallon and one 1,500,000-gallon per day pumping engines estimated to cost $40,000, and being part of a $250,000 waterworks enlargement program. Leon A. Smith is superintendent.

SUPERIOR, WIS.—Chicago & North Western railroad is considering bids for a new 15-engine stall and double drop pit roundhouse at Itasca, suburb of Superior, to replace structure recently burned.

WISCONSIN RAPIDS, WIS.—Consolidated Water Power & Paper Co. is contemplating construction of a 2-story brick and steel finishing room addition, 50 x 300 feet, costing $75,000.

Iowa

EMMETSBURG, IOWA—City plans sewage disposal plant, costing about $50,000. PWA loan has been applied for.

Nebraska

SWANTON, NEBR.—City plans waterworks and distribution system, including deep well and pumping equipment, and steel tank on tower. PWA loan of $14,953 is being arranged.

Colorado

DENVER, COLO.—Judge James Owen and associates are planning to erect a mill at Cripple Creek, Colo., to take care of the excess ore of the Golden Cycle mill. Cost is estimated at about $400,000.

DENVER, COLO.—Bureau of reclamation will call for bids July 8 for furnishing four 24 x 75-foot roller gates and operating mechanism for the canal headworks, imperial dam and desilting works, and all-American canal system.

Pacific Coast

LOS ANGELES—Magnus Co. Inc., 860 North Main street, has awarded contract to Austin Co. of California for erection of a new foundry building on Riverside drive near Randolph street. The building will be a 1-story, steel frame structure, containing 50,500 square feet, steel roof trusses, windows and doors and traveling cranes. Estimated cost $90,000.

GRANTS PASS, OREG.—City officials will receive bids June 28 for construction of a sewage treatment plant and equipment, including tanks, pumps, etc.

JACKSONVILLE, OREG.—City Engineer D. T. McDonough, Medford, Oreg., has prepared plans for extended improvements to local water system. Bids will be received June 27.

SEATTLE—H. D. Fowler, water superintendent, has prepared plans for a proposed $2,000,000 addition to the municipal water system for which a loan and grant will be requested. Project involves 27 miles of 20, 24 and 42-inch steel pipe lines, pumping equipment and tanks.

Dominion of Canada

BRANTFORD, ONT.—C. S. Hotham & Son are planning to erect a new works here for the manufacture of machinery and motor car parts.

Works Program Applications

The following are applications filed with the division of applications and information of the President's work relief program, in Washington, for allotment of funds. An application does not necessarily indicate the program will mature:

Alabama

MONTGOMERY, ALA.—Construction of hangars at Maxwell field, $92,580.

Arkansas

HOT SPRINGS, ARK.—Erection of heating plant addition, $35,000; utility shop and warehouse, $45,000, at army and navy general hospital.

Pacific Coast

ALAMEDA, CALIF.—Construction of air depot shops and hangar, $1,144,694, at Benton field.

SAN DIEGO, CALIF.—Improvement to sewage disposal plant, $40,000; erection of hangars, $1,081,000 at Rockwell field.

SAN FRANCISCO—Construction of garage and shops, $70,000; quartermaster shops, $30,000, and motor shop and garage, $82,500, at the Presidio.

SAN PEDRO, CALIF.—Building ordnance shops, $32,972, at Fort MacArthur.

Delaware

DELAWARE CITY, DEL.—Erection of garage and shop, $24,900, at Fort Dupont.

District of Columbia

WASHINGTON—Erection of hangars, including sprinkler system, $585,000; field shops, $75,000, at Bolling field.

Georgia

ATLANTA, GA.—For new hangars with sprinkler system at Candler field, $226,000.

COLUMBUS, GA.—For building tank shops and sheds at Fort Benning, $18,000.

Illinois

BELLEVILLE, ILL.—For sewage disposal plant, $44,563; hangars and sprinklers, $209,000, at Scott field.

Louisiana

SHREVEPORT, LA.—For sewage disposal plant, $50,000, at Barksdale field.

Maryland

BALTIMORE—For sewage disposal plant and general repairs at Holabird quartermaster depot, $154,935.

Massachusetts

AYER, MASS.—Erection of maintenance shop, $28,000, at Fort Devens.

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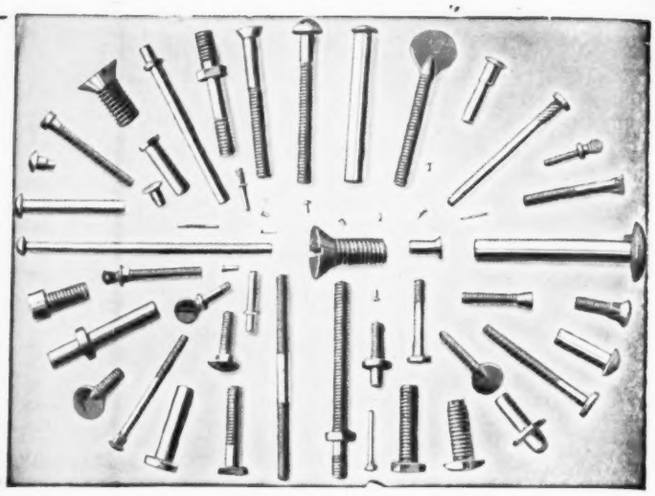

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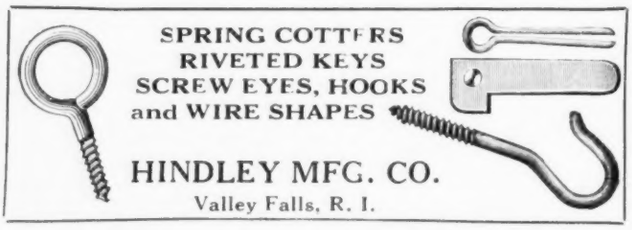

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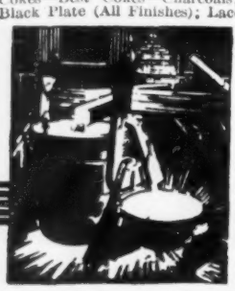

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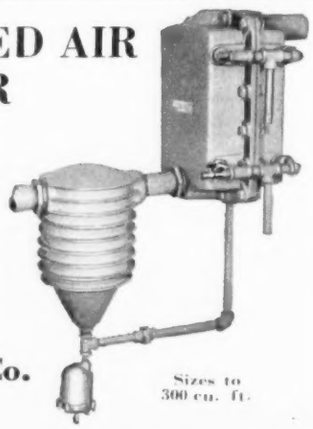

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NICKEL is an alloy which goes into solution in steel (ferrite) and has not only the effect of imparting greater strength but also improves the ductility of any heat-treated part, either by annealing, normalizing or quenching and drawing. Nickel steels have proved their dependability in wide applications over a number of years.

Nickel steels fall in the S. A. E. 2xxx classification. The most widely used nickel steels contain from 3.25 to 3.75 per cent nickel. Other nickel steels, given in the order of their relative popularity, are those containing 5.00 per cent, 1.50 per cent and 0.50 per cent nickel.

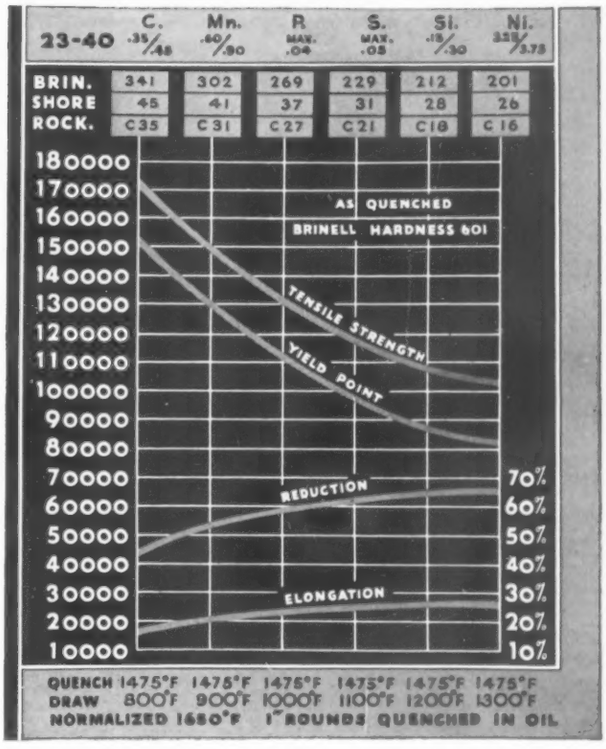
Nickel steels are used in parts where high strength, as measured by yield point, elastic limit, tensile strength and Brinell hardness, must be combined with high ductility and resistance to shock. To realize the maximum combination of properties nickel steels, like all other alloy steels, must be heat-treated.

With a low carbon content (up to 0.25 per cent) the widely used 23xx Series finds application, in the carburized and heat-treated condition, for king pins, rock-drill parts, air-hammer parts, collets, leveler rods, piston pins, universal joints, shackle bolts, spline shafts, rocker arms, gears of all types, countershafts and studs.

As their carbon content increases, the 23xx steels have wide general industrial uses. In the 0.35 to 0.45 carbon range they are used, in both the water- and oil-hardened condition, for heavy-duty shafts, stud shafts, set screws, studs, bolts, steering knuckles, drive shafts, airplane crankshafts, rocker arms, engine bolts and studs, connecting rods.

With higher carbon—0.45 to 0.55 per cent—the 23xx Series becomes oil-hardening, and is used generally for parts requiring exceptional strength, such as heavy-duty gears, pinions, shafts, axles, spindles.

The 25xx steels, containing 5.00 per cent nickel, are carburizing steels. They combine excellent wearing surface with an extremely strong, ductile and shock-resisting core. They are useful for unusually heavy-service parts, such as truck and bus gears, spline shafts, piston pins, countershafts, drive gears, airplane-engine parts. In the heat-treated condition, without carburization, the toughness of these steels lends them to such applications as piston pins for hammers and turbine blading.

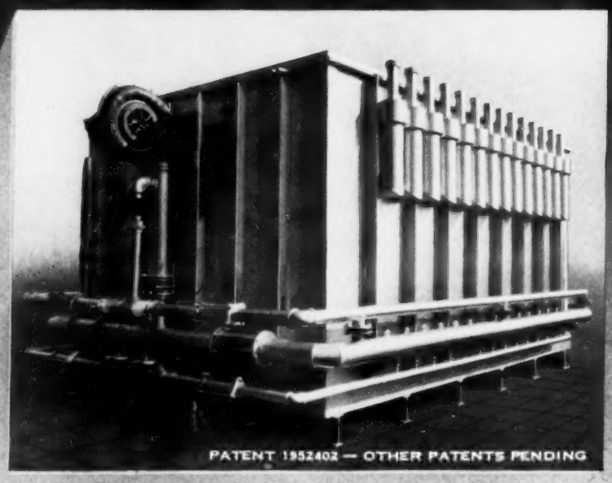


★ *Physical properties of S. A. E. 23-40, a reliable and popular nickel steel.* ★

Nickel steels containing 0.50 and 1.50 per cent nickel (20xx and 21xx) are ordinarily used, in the lower carbon ranges, for carburized parts; they possess greater toughness than carbon steels under parallel conditions, being used extensively for service gears. They are used also, without carburizing, for such parts as engine bolts, staybolts and rivets, and for locomotive spring-rigging.

For highly stressed and reciprocating parts of locomotives nickel steel of the following composition is rapidly coming into use: carbon, 0.20 to 0.30 per cent; manganese, 0.75 to 0.95 per cent; silicon, 0.15 to 0.30 per cent; nickel, 2.50 to 3.00 per cent. This steel is usually put in service in the normalized and annealed condition; but in the case of locomotive axles some railroads quench and draw.

BETHLEHEM STEEL COMPANY
GENERAL OFFICES: BETHLEHEM, PA.



A PERFECT COMBINATION

The combination of the Wilson Vertical Tube Type Annealing Cover with its Special Inner Cover makes possible a reduction of annealing costs with a shorter annealing cycle.

They are sold exclusively by the Lee Wilson Engineering Co. and The Wean Engineering Co., Inc. No other company has been given the right to manufacture or sell them in the United States or Canada.

The Wilson Annealing Unit is covered by Patent No. 1,952,402 and other Patents Pending.

The

WEAN ENGINEERING

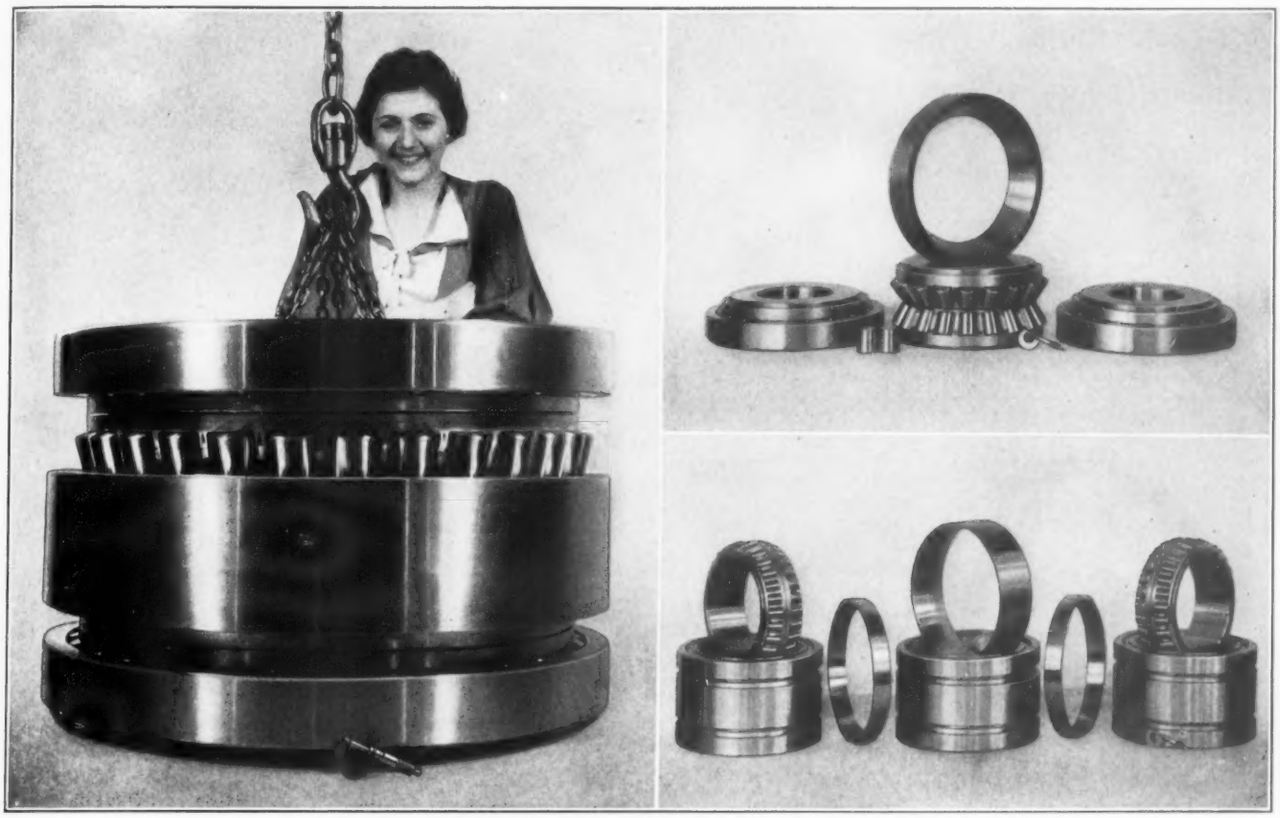
Company Inc.
Warren, Ohio

The Wilson Annealing Units sold by us are an exclusive development of

LEE WILSON ENGINEERING COMPANY • CLEVELAND, OHIO

BANTAM

BEARINGS SPECIFIED 100% ON NEW CONTINENTAL 6 STAND 4 HI HOT STRIP MILL



A total of 214 Bantam Roller Bearings were required for work rolls, backing rolls, screw downs, pinion stands and other auxiliary equipment on this new 6 stand 4 Hi Hot Strip Mill, 18″ & 43″ x 38″, built by Continental Roll and Steel Foundry Company. The bearings on this mill were of the Bantam Taper type with the exception of 35 which were Bantam Straight Roller Bearings.

The 4 row taper backing roll bearing illustrated above is 37″ O.D. x 23″ I.D. x 20″ long and weighs approximately 4,500 pounds. At the right is a group of work roll bearings as well as a number of steep angle single row bearings.

Take your Toughest Bearing job to Bantam

Send for general Bantam catalog on Ball and Roller Bearings.

Trade Mark Reg. U.S. Pat. Off.

BBB

THE BANTAM BALL BEARING CO.

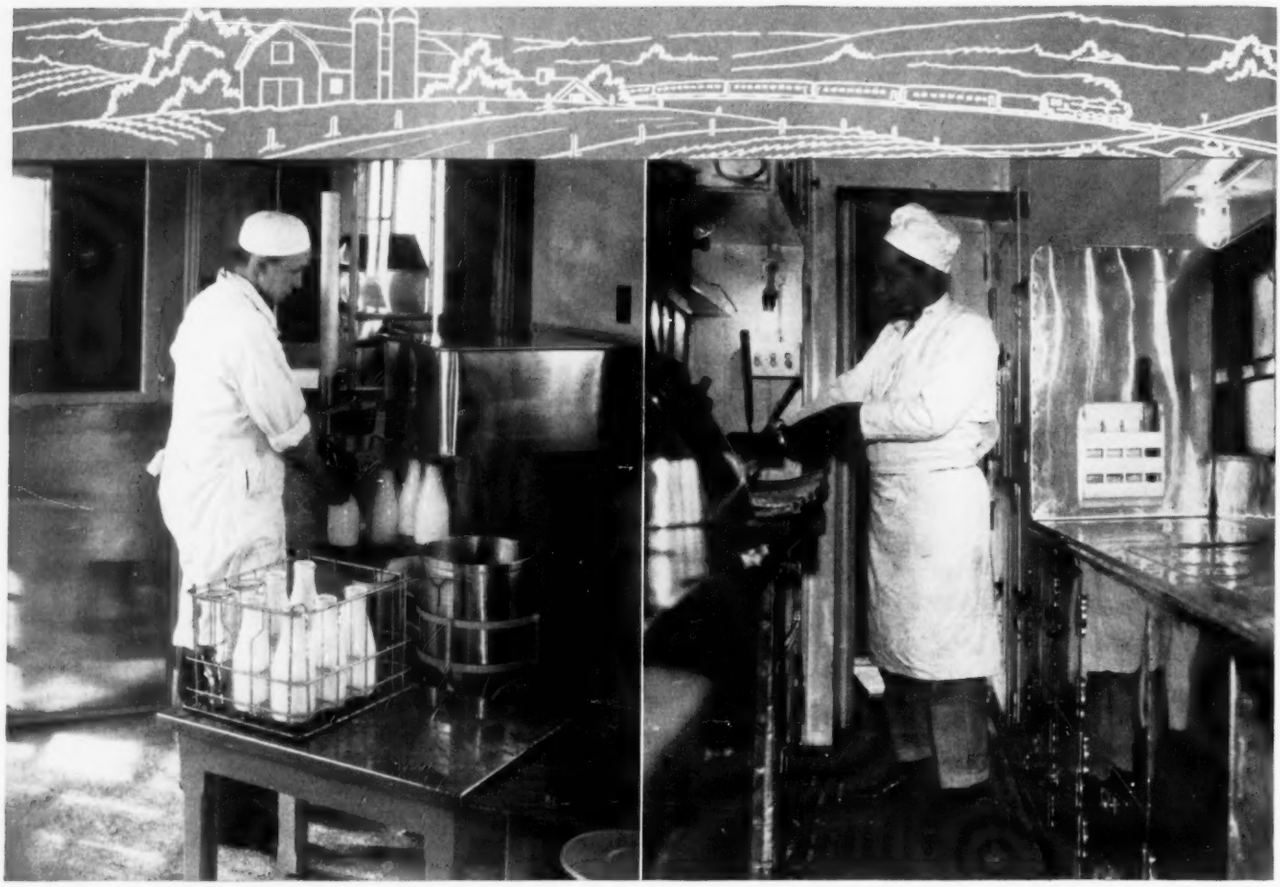
SOUTH BEND, INDIANA

CHICAGO · PHILADELPHIA · YOUNGSTOWN · PITTSBURGH · DETROIT · ROCHESTER, N. Y. · DALLAS · SEATTLE · NEW YORK · TOLEDO · NEW ORLEANS · WASHINGTON, D.C.

ONE OR A HUNDRED MILLION • 1/32″ TO 60″

FROM

DAIRIES TO DINERS



YOU WILL GAIN WITH ARMCO STAINLESS

THIS is proving to be a BIG YEAR for fabricators who sell stainless steel products and equipment to industry and home. And many of these manufacturers are profiting with Armco Stainless Steels—beautifully-finished metals that work readily, repel many kinds of chemical corrosion, and stand up well at elevated temperatures.

You can order Armco Stainless Steels in any flat-rolled form—sheets, strip and plates. There are six different surface finishes, and each of these is perfection of its kind. They range all the way from white-pickled finish to the highest lustre surface obtainable.

You won't have any difficulty in working Armco Stainless Steels, either. They shear, punch, form, draw, spin, weld and solder with only slight modifications in standard practice. Some mighty severe draws have been made with these metals.

Use Armco Stainless Steels for greater strength and lighter weight . . . for heat resistance . . . for things that must be easy to clean and keep clean . . . for products and equipment that must endure with no maintenance cost.

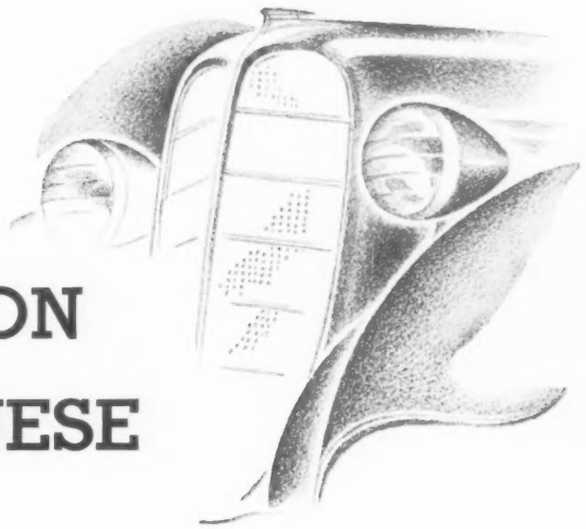
We invite all problems, all applications, all requirements in flat-rolled stainless steels. Just tell us what yours are.

THE AMERICAN ROLLING MILL COMPANY
MIDDLETOWN, OHIO • EXECUTIVE OFFICES

ARMCO
★ ★ ★

STAINLESS STEELS
AMONG THE MANY ARMCO GRADES

FOR HIGHLY STRESSED PARTS



USE MEDIUM CARBON FERROMANGANESE

● High-manganese, low-carbon alloy steels are used for highly stressed parts.

Production of these steels requires special grades of manganese alloys for accurate control and limited costs. The best practice embodies the use of silico-manganese and Medium Carbon Ferromanganese. The use of these alloys is less costly than additions of standard ferromanganese.

With the standard grade, the carbon in the bath must be kept low. Medium Carbon Ferromanganese permits the melter "to go ahead" with more carbon in the bath. The time of melting is decreased, and refractory corrosion is less. Medium Carbon Ferromanganese produces cleaner steel than the higher carbon alloy. There is less oxygen to form harmful inclusions.

Electromet Metallurgists will gladly explain how to use Medium Carbon Ferromanganese for low carbon steels. Write for this information.

PRODUCTS OF A UNIT OF UCC UNION CARBIDE AND CARBON CORPORATION

CHROMIUM
High-Carbon Ferrochrome (maximum 6% carbon)
Low-Carbon Ferrochrome (in grades, maximum 0.06% to maximum 2.00% carbon)
Chromium Metal
Chromium-Copper
Miscellaneous Chromium Alloys

SILICON
Ferrosilicon 15% Ferrosilicon 50%
Ferrosilicon 75%
Ferrosilicon 80 to 85%
Ferrosilicon 90 to 95%
Refined Silicon (minimum 97% Silicon)
Calcium Silicon
Calcium-Aluminum-Silicon
Calcium-Manganese-Silicon
Silicon-Copper
Miscellaneous Silicon Alloys

BRIQUETS
(Patented)
Chrome Briquets Silicon Briquets
Manganese Briquets

COLUMBIUM

TUNGSTEN

MANGANESE
Standard Ferromanganese 78 to 82%
Low-Carbon Ferromanganese
Medium-Carbon Ferromanganese
Spiegeleisen
Manganese Metal
Manganese-Copper
Miscellaneous Manganese Alloys

SILICO-MANGANESE
All grades including Silico-Spiegel

VANADIUM
All Grades

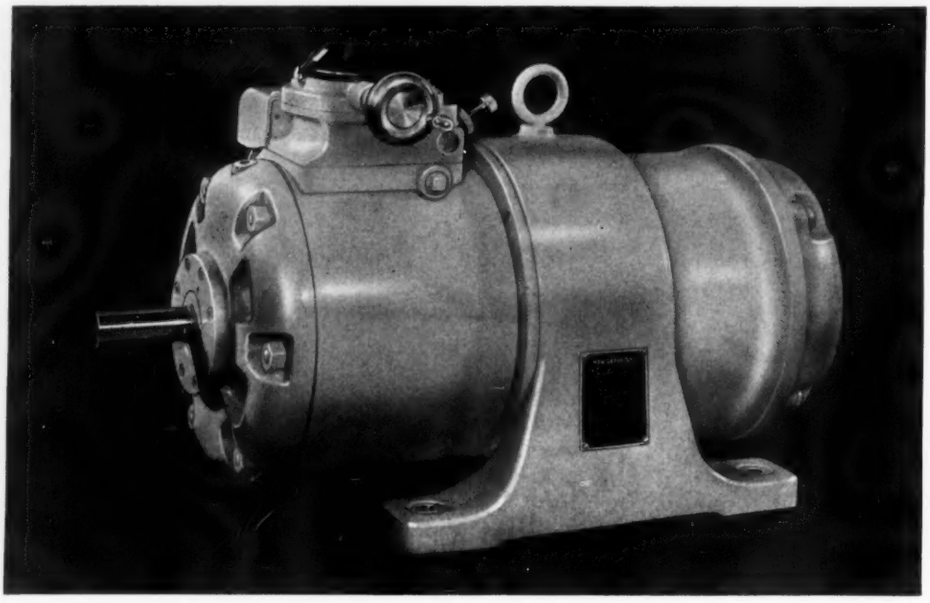
ZIRCONIUM
35 to 40% Zirconium
12 to 15% Zirconium
Aluminum-Zirconium
Zirconium-Manganese-Silicon

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation

UCC

CARBIDE and CARBON BUILDING
30 EAST 42nd STREET, NEW YORK, N. Y.

Electromet
Ferro-Alloys & Metals



Arrived!

A truly simple, compact, self-contained, efficient, infinitely variable speed transmitter

Speed ratio 6 to 1. Constant horsepower at any speed.

Speeds may be pre-selected or adjusted while running.

Always starts from and stops in low-speed, high-torque position.

Torque conscious. Positive drive always assured.

Direct or remote fingertip control of speed selection.

Universal mount. Vertical, horizontal, sidewall, ceiling or floor.

Adaptable to any make or kind of motor.

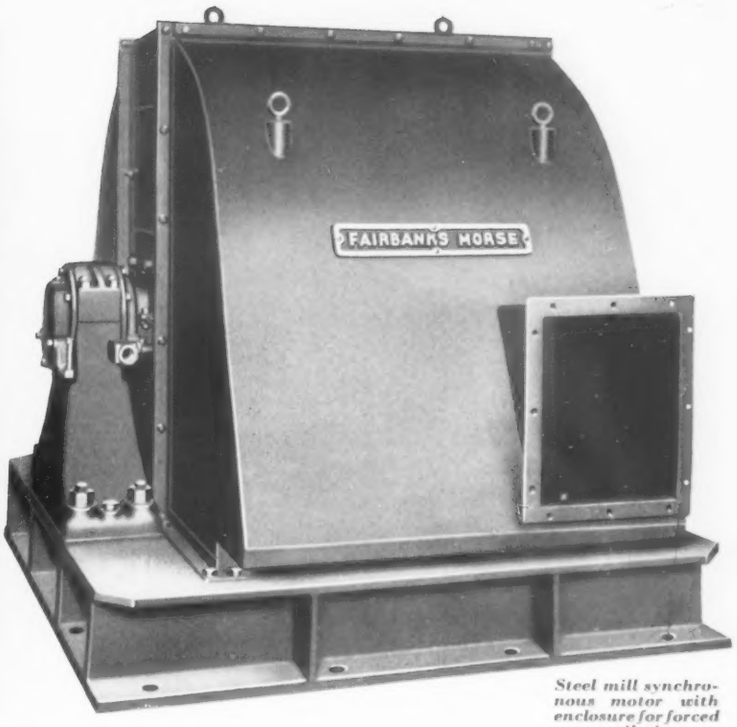
Ball bearing design, workmanship and efficiency applied to the transmission of power.

The New Departure Mfg. Company, Bristol, Connecticut.

NEW DEPARTURE
Variable Speed
TRANSITORQ

DESIGNED
for
METAL-WORKING SERVICE

Fairbanks-Morse motors have the necessary torque, slip and starting current characteristics for the special requirements of metal-working plants



Steel mill synchronous motor with enclosure for forced ventilation.

● Of all the industries we supply electric motors to, there is none more exacting than metal-working. Special torque requirements, constant speeds, variable speeds, multi-speeds, special flange mountings, totally enclosed fan-cooled, enclosed synchronous motors, slow-speed gear drives, etc. That is why Fairbanks-Morse motors for this industry are specially designed for severe service—designed with inbuilt stamina and sturdiness in addition to the special electrical characteristics.

Varying as their electrical demands and service requirements may be, there is one inherent part of design common to every F-M motor. And that is excellence of mechanical design. First to pioneer the *ball bearing* motor, grease tube lubrication and a host of allied improvements, Fairbanks-Morse has always built into the structure of its motors those mechanical characteristics which would enable every motor to stand up under trying service conditions.

For dependable performance, look for the name "Fairbanks-Morse" on the motor.

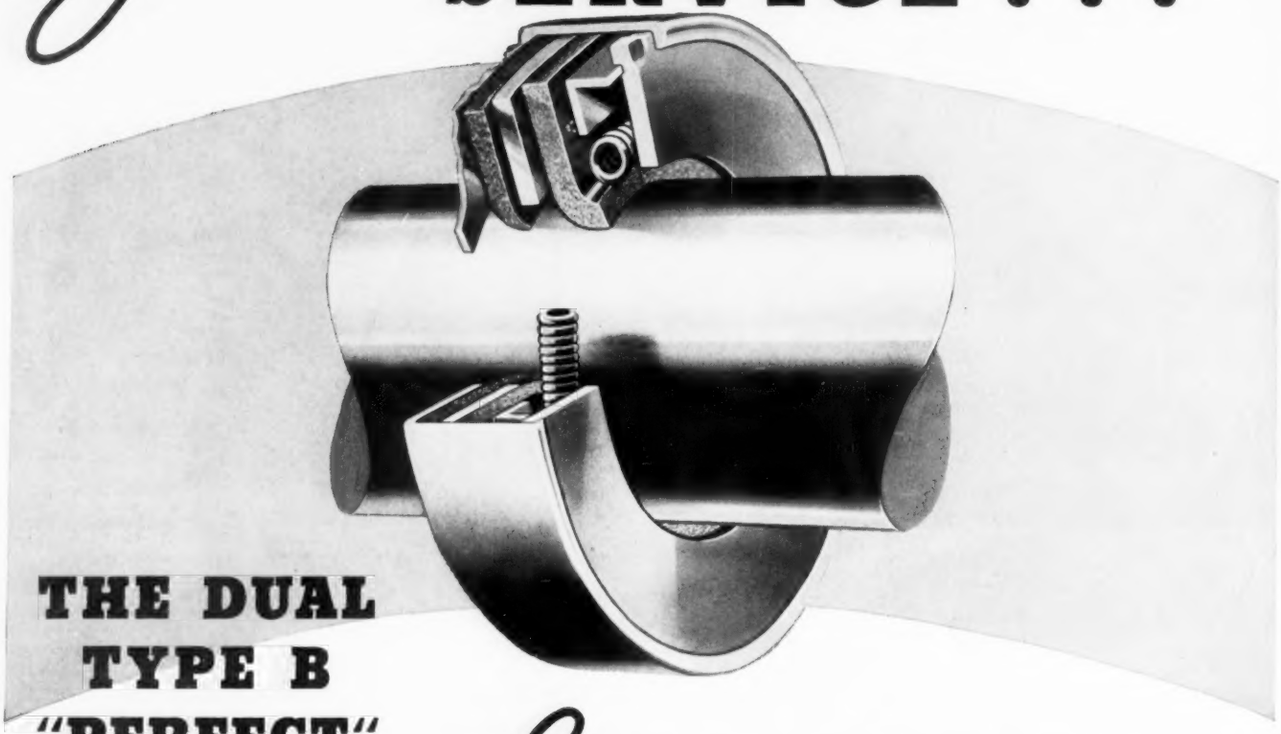
We will gladly supply complete information on any type of F-M regular or special service motors upon request. Address Fairbanks, Morse & Co., 900 South Wabash Avenue, Chicago, Illinois. 32 branches at your service throughout the United States.

Pioneer Designers and Manufacturers of POWER, PUMPING AND WEIGHING EQUIPMENT 105 Years

FAIRBANKS-MORSE
MOTORS

6257-EA 40.69

for VERY SEVERE SERVICE . . .



THE DUAL TYPE B "PERFECT" OIL SEAL

THE Dual Type B Oil Seal was developed especially for very severe bearing service—where shaft speeds are high or lubricant pressures considerably above normal or where both are encountered.

With the auxiliary packing member, spiral spring tension on the main packing member may safely be reduced without jeopardizing the effectiveness of the unit. Shaft friction is thus practically eliminated.

The Dual Type B is effective at speeds up to 2000 R.P.M. Lubricant pressures up to 15 lbs./sq. in. are permissible at speeds up to 1000 R.P.M.

This unit has proved eminently successful on automobile pinion and transmission shafts—an application considerably more critical than normally encountered in machine tool bearings.

Write FOR INFORMATION ON SPECIFIC APPLICATIONS OF THE DUAL TYPE B OIL SEAL

PATENT PENDING

THE CHICAGO RAWHIDE MANUFACTURING COMPANY

1308 ELSTON AVENUE • CHICAGO, ILLINOIS

53 YEARS MANUFACTURING QUALITY MECHANICAL LEATHER GOODS EXCLUSIVELY

NEW YORK PHILADELPHIA PITTSBURGH DETROIT CLEVELAND CINCINNATI BOSTON

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POSITIONS OFFERED
Single Insertion—50c per line
Three to Six Insertions—48c per line
Six or more Insertions—45c per line

Seven words of ordinary length make a line.
FIRST LINE IN BOLD FACE TYPE
A box number address counts as one line.

POSITIONS WANTED
Single Insertion—25c per line
Three to Six Insertions—24c per line
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Positions Wanted

YOUNG MAN, 30 YEARS OF AGE, EXPERIenced as heater and roll hand in continuous rod mill desires connection with Steel Company in rod or strip mill. Good references as to character and ability. Address Box 244, STEEL, Penton Bldg., Cleveland.

MANUFACTURERS' REPRESENTATIVE EStablished with Industrial Trade in Illinois, Indiana and Wisconsin wants additional metal lines on commission basis. Address Box 234, STEEL, Penton Bldg., Cleveland.

WELL ESTABLISHED MANUFACTURER'S representative Philadelphia and surrounding territory would like to secure Hot and Cold Rolled Strip Mill account. Address Box 230, STEEL, Penton Bldg., Cleveland.

PURCHASING AGENT

or assistant

10 years experience mill, electrical, office supplies. Familiar with follow-up, price records, costs. Prefer middle west. Excellent references. Address Box 240, STEEL, Penton Bldg., Cleveland.

POSITION WANTED AS SHOP MANAGER or Superintendent: By man well trained in general machine shop work; also has thorough knowledge of tool and jig design, cost estimating and piece work system. Age 47 years, married and settled. Have been employed for past seventeen years by manufacturer of railway supplies. Can furnish references. Address Box 239, STEEL, Penton Bldg., Cleveland.

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OHIO

THE COMMERCIAL STEEL CASTINGS CO., Marion. Acid open hearth steel castings 5 lbs to 10 tons. Shipping facilities on five railroads

THE WEST STEEL CASTING CO., Cleveland. Fully equipped for any production problem. Two 1½ ton Elec. Furnaces. Makers of high grade light steel castings, also alloy castings subject to wear or high heat.

PENNSYLVANIA

NORTH WALES MACHINE CO. INC., NORTH Wales. Grey Iron, Nickel, Chrome, Molybdenum Alloys. Semi-steel. Superior quality machine and hand molded, sand blast and tumbled.

Stampings

MICHIGAN

LANSING STAMPING CO., 1171 Penn Ave. Lansing. Heavy, medium and light metal stampings. Send blue prints or samples for estimates

Those desiring to give special prominence to their advertisements may buy space by the inch and have their advertisements appear in bold face type with white space at top and bottom RATES:

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1 inch	$ 5.00	$ 4.75	$ 4.50	$ 4.25
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3 inches	14.00	13.50	12.75	12.00
4 inches	18.00	17.25	16.50	15.75

Count 10 lines to the inch for actual type matter and allow accordingly when white space is desired. **Advertising copy should reach us Wednesday prior to date of issue. STEEL is issued weekly on Monday.**

Books

BOOKS

ON THE

HEAT TREATMENT OF STEEL

Constitution of Steel and Cast Iron —Sisco **$3.00**
Discusses the theory underlying the constitution and heat treatment of steel and cast iron.

Principles of the Heat Treatment of Steel—By the Metallurgical Staff of the Bureau of Standards—Cloth **$1.50**
Paper **$1.00**
Contains elementary facts and principles of the heat treatment of steel.

Nitriding Symposium **$2.00**
Gives complete information and investigations on the Nitriding Process.

Heat Treatment, Uses and Properties of Steel—Knowlton..... **$4.50**
A comprehensive book devoted to the treatment and processing of all types of iron and steel.

Quenching of Steels—French..... **$2.50**
This book is based primarily upon laboratory researches and the "art of quenching."

Application of Science to the Steel Industry—Hatfield **$2.50**
Includes steel making manipulation and treatment, special steels, corrosion and acid resisting steels, effect of temperature on steels and tool and cutlery steels.

Lectures on Steel and Its Treatment—Keller **$3.50**
Describes in nontechnical language the manufacture of iron and steel.

Inclusions in Iron—Wohrman..... **$3.00**
A study of inclusions in ferrous metals, in which the inclusions are definitely known.

Above Books Published by
American Society for Metals
and for sale by

Book Department

THE PENTON PUBLISHING COMPANY

1213 W. 3rd St., Cleveland, Ohio.

Employment Service

SALARIED POSITIONS

$2,500 to $25,000

This thoroughly organized advertising service of 25 years' recognized standing and reputation carries on preliminary negotiations for positions of the caliber indicated, through a procedure individualized to each client's personal requirements. Several weeks are required to negotiate and each individual must finance the moderate cost of his own campaign. Retaining fee protected by a refund provision as stipulated in our agreement. Identity is covered and, if employed, present position protected. If you have actually earned over $2,500, send only name and address for details. R. W. Bixby, Inc., 130 Delward Bldg., Buffalo, N. Y.

FROM COAST TO COAST

Confidential Service Bureau for Executives and Professional Men. High Salaried Men wishing to improve or seeking employment. Moderate fee to be paid to finance Direct Mail Campaign. Refund provided for. Send name and address to R. H. Bar and Co., Dept. G., Book Bldg., Detroit, Michigan.

Help Wanted

WANTED — MANUFACTURERS REPRESENtative in Chicago territory to handle Sheet Metal specialties. Write full particulars. Address Box 243, STEEL, Penton Bldg., Cleveland.

WANTED — SEVERAL DESIGNERS AND Draftsmen experienced in rolling mill machinery design. State experience and salary expected. Address Box 242 STEEL, Penton Bldg., Cleveland.

Opportunities

FOR SALE: U. S. PATENT COVERING ARTIcle for building trades requiring plain and formed steel sheets. Claims good enough that Nationally known fabricator attempting to establish ownership through interference proceeding. Address Box 245, STEEL, Penton Bldg., Cleveland.

Notices

OFFICIAL NOTICE

Notice is hereby given that the affairs of the Code Authority of the Gray Iron Foundry Industry are to be liquidated forthwith. Creditors having any claims against said Code Authority are hereby requested to send them in to the Administrative Office of the Code Authority within ten days from this date. The Code Authority Administrative Office is located at 1010 Public Square Building, Cleveland, Ohio.

• • ADVERTISING INDEX • •

Where-to-Buy Products index carried in first issue of month.

	Page
Acme Steel Co.	—
Adams, J. D., Co.	—
Alan Wood Steel Co.	—
Allen Bradley Co.	—
Alpha Lux Co., Inc.	—
Alrose Chemical Co.	—
Aluminum Industries, Inc.	—
American Bridge Co.	—
American Chemical Paint Co.	—
American Gas Association	—
American Rolling Mill Co.	6
American Sheet & Tin Plate Co.	—
American Steel & Wire Co.	—
Andrews Steel Co.	—
Anti-Borax Compound Co.	86
Armstrong Cork Products Co.	—
Atlas Car & Mfg. Co.	—
Bailey, Wm. M., Co.	—
Bantam Ball Bearing Co.	5
Barnes-Gibson-Raymond, Inc.	—
Beatty Machine & Mfg. Co.	84
Belmont Iron Works	88
Bethlehem Steel Co.	3
Biltmore Hotel	—
Bissett Steel Co., Inc.	—
Blaw-Knox Co.	—
Bliss & Laughlin, Inc.	69
Brooke, E. & G., Iron Co.	—
Brookmire Corp.	—
Buell, Wm. C., Jr.	—
Buffalo Wire Works Co.	88
Burden Iron Co., The	—
Cadman, A. W., Mfg. Co.	—
Carborundum Co.	—
Carnegie Steel Co.	—
Ceilcote Co.	—
Chain Belt Co.	—
Chambersburg Engineering Co.	—
Chicago Pneumatic Tool Co.	—
Chicago Rawhide Mfg. Co.	10
Clark Controller Co.	70
Cleveland Hotel	72
Climax Molybdenum Co.	—
Cold Metal Process Co.	—
Columbia Electric Mfg. Co.	—
Columbus Die, Tool & Machine Co.	—
Commodore Hotel	75
Continental Steel Corp.	—
Coppus Engineering Corp.	76
Cramp Brass and Iron Foundries Co.	—
Criswell, James, Co.	—
Crosby Co.	79
Cunningham, M. E., Co.	—
Curtis Pneumatic Machinery Co.	—
Danly Machine Specialties, Inc.	—
Detroit Leland Hotel	—
Dietzel Lead Burning Co.	—
Driver-Harris Co.	—
Eisler Engineering Co., Inc.	—
Electric Furnace Co.	—
Electro Metallurgical Company	7
Enterprise Galvanizing Co.	83
Erie Foundry Co.	71
Eureka Fire Brick Works	—
Excelsior Tool & Machine Co.	—
Fafnir Bearing Co.	—
Fairbanks, Morse & Co.	9
Flinn & Dreffein Co.	86
Foote Bros. Gear & Machine Co.	—
Ford Chain Block Co.	—
Forest City Foundries Co.	86
Forging and Casting Corp.	—
General Electric Co.	—
General Electric Vapor Lamp Co.	—
Gifford Engine Co.	—

	Page
Goodrich, B. F., Co.	—
Granite City Steel Co.	—
Gulf Refining Co.	—
Hanna Furnace Corp.	86
Harnischfeger Corp.	68
Harrington & King Perforating Co., The	88
Hauser-Stander Tank Co.	—
Heald Machine Co.	—
Hindley Mfg. Co.	88
Holcroft & Co.	—
Hyatt Roller Bearing Co.	—
Hyde Park Foundry & Machine Co.	84
Illinois Steel Co.	—
Industrial Brownhoist Corp.	84
Industrial Plants Corp.	Front Cover
Industrial Steel Casting Co.	86
Ingersoll-Rand Co.	—
Inland Steel Co.	—
International Nickel Co.	—
Jones & Laughlin Steel Corp.	—
Kardong Brothers, Inc.	—
Kidd Drawn Steel Co.	—
King Fifth Wheel Co.	—
Koppers Construction Co.	—
Laclede Steel Co.	88
Landis Machine Co.	—
Landis Tool Co.	—
Lansing Stamping Co.	86
Latrobe Electric Steel Co.	88
Lewis Foundry & Machine Co.	—
Lincoln Electric Co.	—
Linde Air Products Co.	—
Link Belt Co.	—
Ludlum Steel Co.	—
Lukens Steel Co.	—
Mackintosh-Hemphill Co.	—
Macklin Co.	—
Magnetic Mfg. Co.	—
Maurath, Inc.	—
Medart Co., The	—
Mesta Machine Co.	—
Metallizing Co. of America	—
Michigan Leather Packing Co.	—
Midvale Co., The	—
Moltrup Steel Products Co.	—
Morgan Engineering Co.	—
Morrison Engineering Co.	—
Murray Iron Works Co.	—
National Forge & Ordnance Co.	—
National Machine Tool Builders Assn.	51
National Roll & Foundry Co.	—
National Tube Co.	—
New Departure Mfg. Co.	8
Newport Rolling Mill Co.	—
Norton Co., The	—
Ohio Carbon Co.	—
Ohio Ferro-Alloys Co.	—
Ohio Structural Steel Co.	—
Oliver Iron & Steel Corp.	—
Oxweld Acetylene Co.	—
Page Steel & Wire Division	—
Parish Pressed Steel Co.	81
Peoria Malleable Castings Co.	86
Perin Engineering Co., Inc.	—
Perkins, B. F., & Son, Inc.	—
Pickands, Mather & Co.	—

	Page
Pittsburgh Crushed Steel Co.	86
Pittsburgh Lectromelt Furnace Corp.	86
Pittsburgh Metallurgical Co.	—
Pittsburgh Rolls Corp.	—
Pittsburgh Tool Steel Wire Co.	83
Pressed Steel Tank Co.	—
Prest-O-Lite Co., Inc.	—
Progressive Mfg. Co.	88
Propellair, Inc.	—
Raymond Mfg. Co.	—
Reading Iron Co.	82
Republic Steel Corp.	53
Roeblings, John A., Sons Co.	—
Ruemelin Mfg. Co.	88
Ryerson, Joseph T., & Son Co.	12
Samuel, Frank, & Co., Inc.	—
Seneca Wire & Mfg. Co.	82
Shaw-Box Crane & Hoist Co., Inc.	—
Shenango-Penn Mold Co.	—
Sherwin-Williams Co.	—
Shuster, F. B., Co., The	—
Simonds Mfg. Co.	84
S. K. F. Industries, Inc.	—
Socony-Vacuum Oil Co.	—
Square D Company	—
Standard Oil Co. of Indiana	—
Standard Steel Works Co.	—
Stanley Works	—
Steel & Tubes, Inc.	—
Strong, Carlisle & Hammond Co.	86
Sun Oil Co.	—
Superior Sheet Steel Co. Division of Continental Steel Corp.	—
Superior Steel Corp.	78
Surface Combustion Co.	Inside Front Cover
Taylor-Wilson Mfg. Co.	—
Tennessee Coal, Iron & R. R. Co.	—
Thomas Spacing Machine Co.	86
Thomas Steel Co.	—
Thomson-Gibb Electric Welding Co.	86
Timken Roller Bearing Co.	Back Cover
Timken Steel & Tube Co.	—
Tinnerman Stove & Range Co.	80
Titanium Alloy Mfg. Co.	—
Truscon Steel Co.	—
Udylite Co.	—
Union Carbide & Carbon Corp.	7
Union Carbide Sales Co.	—
Union Drawn Steel Co.	—
United Engineering & Foundry Co.	—
United States Steel Corp., Subsidiaries	—
Upson Nut Division Republic Steel Corp.	—
Vanadium Corp. of America	—
Washburn Wire Co.	—
Washburn Wire Co., Inc.	—
Waterbury Farrel Foundry & Machine Co.	87
Wean Engineering Co.	4
Weirton Steel Co.	88
Wellman Engineering Co.	—
West Leechburg Steel Co.	—
West Steel Castings Co.	86
Wickwire-Spencer Steel Co.	55
Wiggins, John B., Co.	—
Wilson, Lee Engineering Co.	4
Worthington Pump & Machinery Corp.	—
Worth Steel Co.	—
Wyckoff Drawn Steel Co.	77
Yale & Towne Mfg. Co.	—
Younstown Sheet & Tube Co.	Inside Back Cover
Z-K Equipment & Supply Co.	85

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JUN - 4 1935

June 24, 1935

STEEL

PRODUCTION • PROCESSING • DISTRIBUTION • USE

FOR FORTY-EIGHT YEARS—IRON TRADE REVIEW

Notice

THE RECEIVERS of the Willys-Overland Company have ordered us to sell at once all of the machinery heretofor reserved for the prospective manufacture of a six cylinder (Model 99) automobile.

This comprises the entire Model 99 lines of machinery at

WILLYS-OVERLAND COMPANY

TOLEDO, OHIO

AND

WILSON FOUNDRY & MACHINE COMPANY

PONTIAC, MICH.

APPROXIMATELY 4000 MACHINES FOR IMMEDIATE SALE!

Due to the decision of the Receivers not to manufacture the six cylinder Model 99, approximately 4000 high grade modern machines have been released for immediate sale.

This is not excess machinery but comprises the ENTIRE EQUIPMENT for manufacture of the Model 99—6 cylinder car, including:

Toggle Presses, Mult-au-Matics, Milling Machines, Engine and Production Lathes, Drills, Crankshaft Lathes, Automatics, Duo-Matics, Boring Machines, Gang and Multiple Drills, Grinders, Spot, Butt and Seam Welders, Hammers, Gear Manufacturing Machinery, Ingersoll Machines, Forging Machinery, Tool Room Machinery, Woodworking Machinery, Axle, LeBlond Automatic Crankshaft Lathes and literally thousands of items too numerous to detail.

This affords an unusual opportunity to purchase for immediate delivery . . . at bargain prices . . . a complete assortment of standard high grade modern machinery.

Due to the great quantity and diversity of the machinery to be sold it will be impossible to prepare for distribution "complete lists," with prices. Come to Toledo prepared to do business . . . First come, first served!

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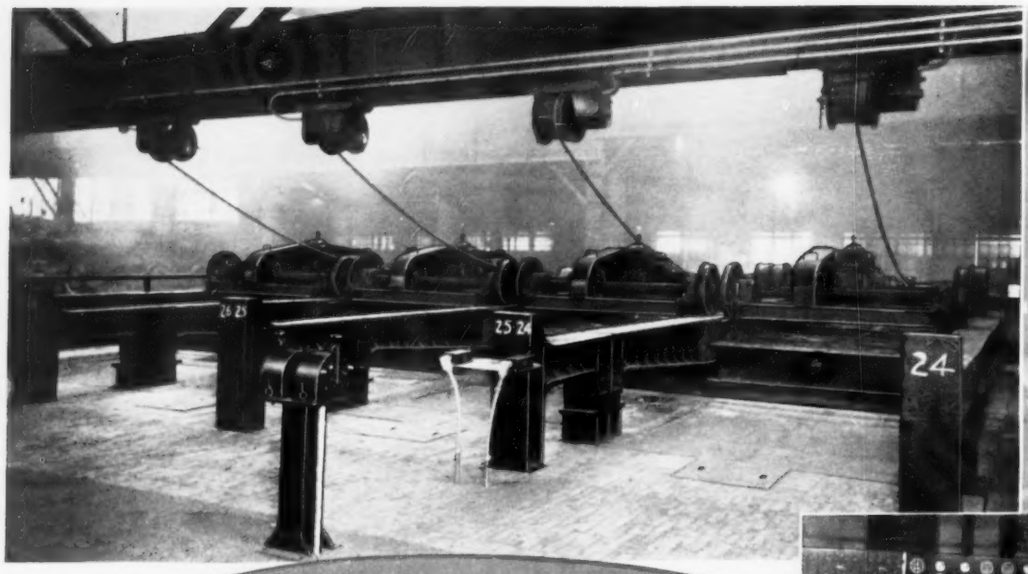

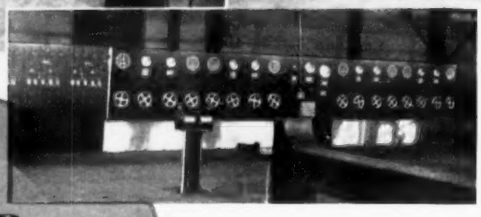

MODERN ONE WAY FIRED SOAKING PITS

One way fired pits are now accepted throughout the steel industry as the *modern* soaking pits because of their many advantages and the important savings they make possible. Most pits now in use can easily be converted into up-to-date One-Way Fired Pits. Designs are available for coke-oven gas, producer gas, blast-furnace gas, natural gas, oil, or combinations of these fuels. Layouts showing some typical conversions will be sent on request.

ADVANTAGES OF ONE WAY PITS

1. Fuel saving from 20% to 35% compared to reversing pits operating in the same plant under same operating conditions.
2. Large reduction in maintenance, since there are no checkers or reversing valves.
3. Better heated steel because of the vertical horseshoe travel of flame, and because burner ports are designed to properly mix and direct the fuel.
4. Reduction of scale by controlling the atmosphere in the pits.
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Surface Combustion Corporation

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TOLEDO, OHIO

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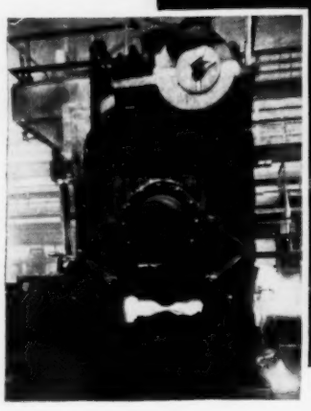

Mesta 4-High Hot Mill operated by Wheeling Steel Corporation. Timken-equipped on back-up and work rolls.

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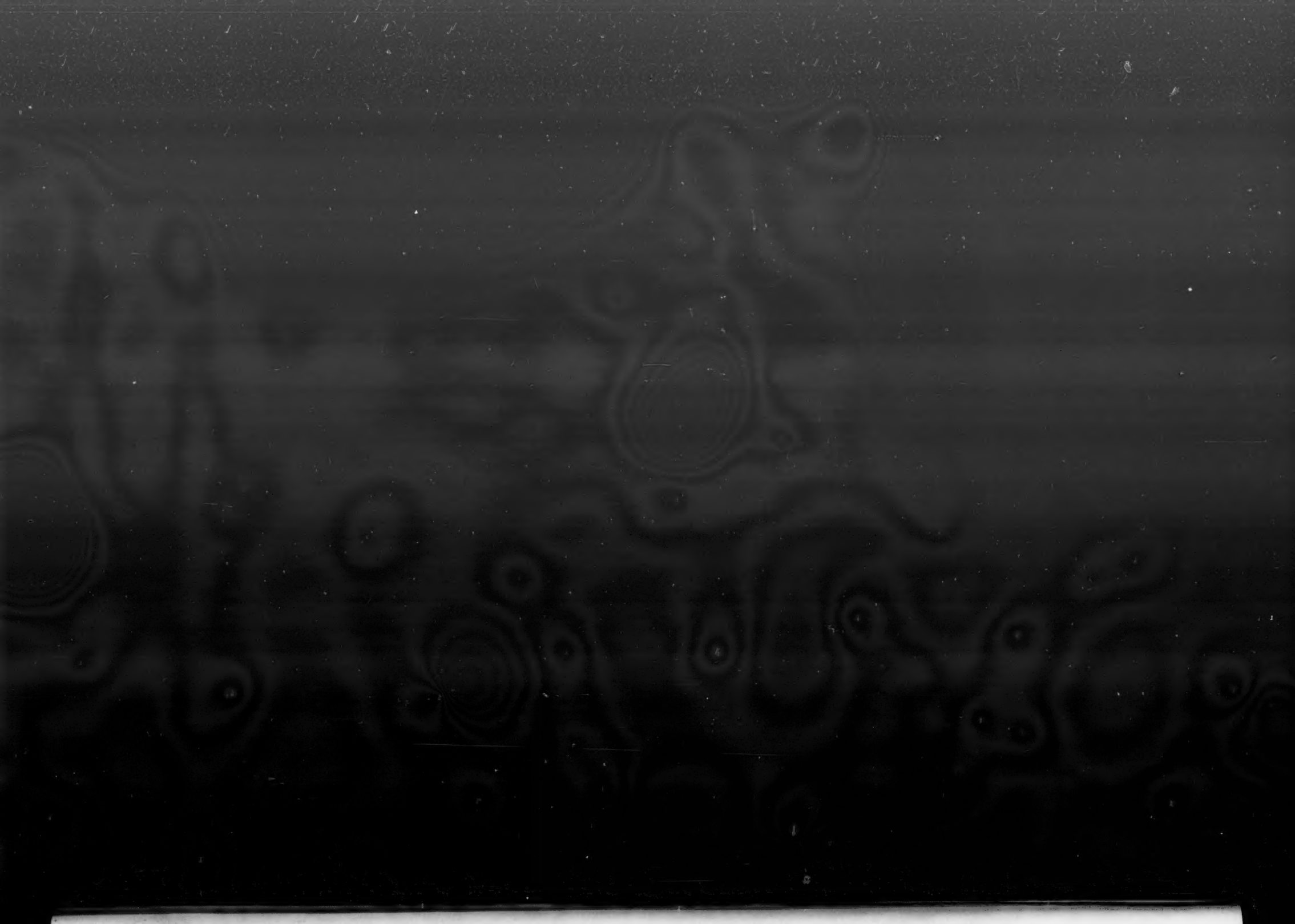
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